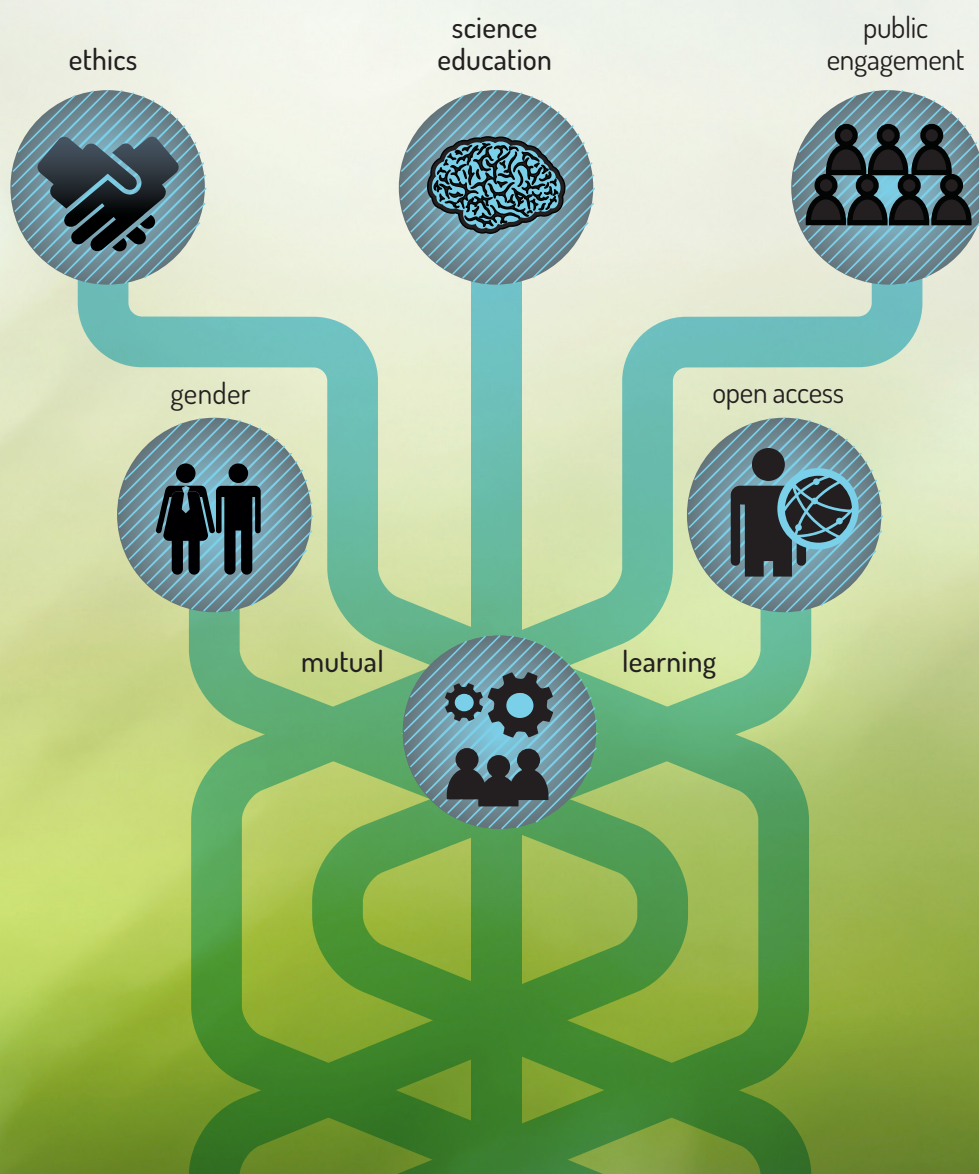


## Discussion paper on the analysis of organizational barriers (TNO)

Deliverable D5.1



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## Purpose

The purpose of this deliverable (D5.1) is to help the people working in the JERRI project to better understand the barriers and enablers that they are will encounter in realizing the goals and actions that were defined in D3.1.

Based on state-of-the-art theory in organizational behaviour, key information about the TNO organisation and the goals setting that has been performed in D3.1 and D3.2. This deliverable aims at analysing the organizational barriers with regard to the transition towards the previously defined goals. Empirical information has been gathered by qualitative interviews with change agents, e.g. the organizations' employees. Lessons learned and insights have been gathered and structured to help successfully institutionalising changing the organisations narrative and overcome barriers.

The outcomes of this deliverable will feed into the stakeholder-/workshop-based development of RRI action plans for each of the five key dimensions. This deliverable (D5.2) will be completed later in time.

## Executive Summary

This deliverable aims to identify and discuss barriers and enablers that we encountered within TNO in the institutionalisation of RRI, and is meant to find transition paths from our current state towards our specific ambitions (narrative), and, more specifically, to realize the goals that have been set for specific RRI dimensions in earlier deliverables in the JERRI project.

Our approach is that barriers need to be lifted or circumvented and that the enablers can help in this respect. Moreover, we identified key change agents—within TNO, as the institutionalisation is meant to happen within TNO—and involved them in our activities, e.g., to discuss current ways of working, processes, guidelines, and management systems—and also actively involve them in bringing about the desired changes (chapter 1).

For each dimension we have systematically categorised the relevant elements for deep institutionalisation. Through different methods we have identified enablers and barriers on the level of individual dimensions and taken on board what can be done. Conclusions and recommendations at the level of each RRI dimension have been made (chapter 2).

In Chapter 3 we have elaborated on institutionalisation, drawing a wider perspective on how successful implementation towards a specific narrative could be enabled, specifically looking at themes such as internalization of values, normative goal setting, governance, trust, resistance and the role of change agents.

In Chapter four we publish our conclusions and key lessons learned, that can be re-used in the further development of the JERRI-project.

## 1 Introduction

This deliverable discusses the efforts of TNO to institutionalise Responsible Research and Innovation (RRI), and the barriers and enablers that the people involved encountered in doing this. This deliverable builds on earlier work done in the JERRI project. Based upon a mixed method of information gathering, we sketch a picture in where we depict how we got where we are, how we experience this and what inhibits us and what enables us to take next steps in the JERRI project. A key starting point for this deliverable are JERRI D1.1 *State of Art* and JERRI D3.2 *Description of Specific RRI Goals for TNO*. Since the start of the project, however, we have been able to develop a better and wider understanding of the challenge at hand.

### 1.1 Institutionalisation

Conceptually, we propose to understand ‘institutionalisation’ as a conscious and systematic attempt in organizational change towards the (further) development, implementation and professionalization of RRI practices. More specifically, we characterize ‘institutionalisation’ with the following constituent elements (JERRI D1.2 *Deepening ‘Deep Institutionalisation’*: pp. 3-4):

- the internalization of specific societal values and the embedding of these values in practices in the organization;
- the transformation towards specific normative goals;
- the alignment, integration and interconnection of multiple governance tools, processes and structures;
- enabled by effective leadership, including, e.g., vision and support, both top-down and bottom-up;
- and enabled by creating clarity about roles, tasks, responsibilities, processes and structures.

In an earlier deliverable (JERRI D1.2: pp. 42 ff.), six different strategies for organizations to relate to RRI were described, in the form of ‘narratives’; see *Table 1* below.

*Table 1: Different strategies for organizations to relate to Responsible Research and Innovation*

<i>A/ Republic of Science</i>
<i>B/ Technological Progress: Weighing Risks and Harms as well as Benefits of New and Emerging Technologies</i>
<i>C/ Participatory Society</i>
<i>D/ The Citizen Firm</i>
<i>E/ Moral Globalisation</i>
<i>F/ Research and Innovation With/for Society</i>

As discussed in JERRI D3.1 *Concept on organizational RRI goal development: ‘How we set goals’*, we discussed, from the perspective of the JERRI project team members, the position of TNO.

With its mission, to “connect people and knowledge to create innovations that boost the sustainable competitive strength of industry and well-being of society”, TNO is currently mostly related to *Narrative B: Technological Progress*—which is characterized by a trust in technological progress, with an additional and healthy dose of risk management. Its source of legitimacy is proved by the Triple Helix (or ‘Iron Triangle’) of business, knowledge, and government; they trust TNO to contribute to the improvement of both economy and society (see Flywheel of innovation in the Netherlands, TNO Strategic Plan 2018-2021, pp17). A part of TNO’s work is also related to *Narrative C: Participatory Society*, which aims to include also the concerns and interests of societal actors, in order to create products that are more aligned to societal needs.

The work of TNO bears little or no resemblance to *Narrative A: Science Republic* (since TNO is concerned with applied science), to *Narrative D: Citizen Firm* (since TNO is primarily oriented to working for paying clients) and to *Narrative E: Moral globalization* (since TNO is mostly focused on The Netherlands and Europe; with the exception of international science, and global issues, like security and sustainability, and the Innovation4Development programme).

After discussion in the project team we conclude that the overall ambition of TNO is to move towards *Narrative F: Research and Innovation With/for Society*, e.g., in its ambitions to ameliorate pressing societal problems, and its formulation of a new CSR Strategy (available at <https://www.tno.nl/en/about-tno/tno-and-its-social-role/corporate-social-responsibility-csr/>) (and its participation in the JERRI project).

This deliverable aims to identify and discuss barriers and enablers that we encountered within TNO in the institutionalisation of RRI, and is meant to find transition paths from our current state towards our specific ambitions (narrative), and, more specifically, to realize the goals that have been set for specific RRI dimensions. The main idea is that barriers need to be lifted or circumvented and that the enablers can help in this respect. Moreover, we identified key change agents—within TNO, as the institutionalisation is meant to happen within TNO—and involved them in our activities, e.g., to discuss current ways of working, processes, guidelines, and management systems—and also actively involve them in bringing about the desired changes (see next section).

## 1.2 Research question and methodology

Our current research question is the following: *What are the barriers and enablers that people in TNO encounter in their attempts to (further) institutionalize RRI within TNO?*

Our research methodology has been a qualitative study, involving the following:

- Interviews and workshops with change agents and key personnel;
- Observations of the process (how things develop over time), using the STAR method (Situation; Task; Action; Results), which has helped to document the situation we found ourselves in, the roles and tasks of the people involved, the various actions of those people, and the effects or results of these actions;
- Participation in interventions and activities to bring about change, in collaboration with change agents; in order to encounter barriers and identify enablers;
- And the analysis of relevant documents, e.g., documents written by change agents and key personnel.

Table 2 (below) provides an overview of interviews and workshops with change agents; these interactions had two overlapping goals: to identify and discuss barriers and enablers with them; and to involve them in lifting barriers and creating enablers.

*Table 2: Overview of workshops and interviews with change agents, mostly within TNO*

<b>RRI dimension</b>	<b>Interactions with change agents within TNO</b>
Ethics	A workshop with four influencers (within TNO) Two interviews with experts and potential users (within TNO)
Gender Equality	Three interviews with change agents (within TNO) One interview with an external expert (outside TNO)
Societal Engagement	A meeting with strategy managers of nine new Units (within TNO) Two meetings with directors of nine new Units (within TNO)
Science Education	Three interviews with change agents (within TNO)
Open Access	Workshop with 10 change agents (within TNO), two interviews with change agents (within TNO)

It is important to mention that the JERRI project team members themselves are also change agents (e.g., one is Corporate Social Responsibility Officer, another is Integrity Officer), and that they have been organizing and implementing interventions in close collaboration with other change agents. In other words: our research was a form of Action Research, which aims to combine knowledge development, problem solving, and learning and competence building (moving towards the institutionalisation of RRI, in this case)—see Figure 1.

Action research has the following characteristics (Guertler et al., 2017: pp. 5-6):

- It is future oriented; it aims to bring about change or solve problems, looking forward (based, partly, on an understanding of the past, of course);
- It is focused on collaboration; in this case between project team members (who acted also as researchers) and key personnel (who were change agents);

- It aims at capability development; which, in our case is understood as ‘institutionalisation’, including (mutual) learning and competence building;
- It builds on the tradition of grounded theory, where theory is generated and evaluated based on real life practice, which increases its practical relevance.

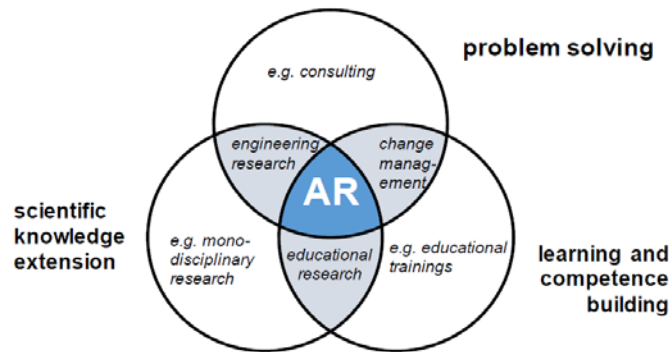


Figure 1: The three core elements of Action Research (Guertler et al., 2017)

In the next sections, we will discuss the barriers and enablers that we encountered (or anticipate) in the ‘deep institutionalisation’ of RRI within TNO. We will first discuss barriers and enablers for each of the five dimensions of RRI (Ethics; Gender Equality; Societal Engagement; Science Education; and Open Access) and then discuss barriers and enablers across the dimensions. In order to interpret these discussions, it is important to note that different dimensions of RRI have different levels of maturity (institutionalisation)—see Figure 2.

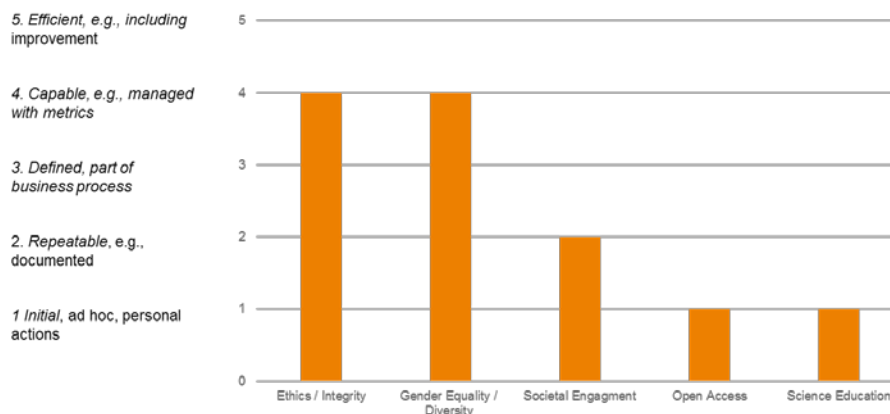


Figure 2: Dimensions of RRI have different levels of maturity (institutionalisation) at TNO (source D3.2: p: 10)

Ethics and Gender Equality have relatively high levels of maturity or institutionalisation, whereas Open Access and Science Education have relatively low levels of maturity or institutionalisation, with Societal Engagement in a level in-between. As a consequence, it is likely that the barriers and enablers will be different across dimensions. E.g., the barriers and enablers for Ethics (which is already relatively well-established within TNO) will be different from those for Open Access (which is currently less developed within TNO).



## 2 Barriers and enablers for different dimensions or RRI

The following sections contain discussions of the enablers and barriers for the institutionalisation of the different dimensions or RRI: Ethics; Gender Equality; Societal Engagement; Science Education; and Open Access.

### 2.1 Barriers and enablers for Ethics (Integrity)

Ethics (or Integrity, as it is referred to within TNO) has a relatively high level of maturity in TNO ('capable, e.g., managed with metrics'), and is institutionalized via an Integrity Platform, an Integrity Commission, an Integrity Officer, confidential counsellors, a Code of Conduct, and specific policies, e.g., on auxiliary activities and whistleblowing. Furthermore, TNO aims to uphold and embody four 'core values': integrity; independence; professional conduct; and engagement with society.

Moreover, five elements of Ethics/Integrity are distinguished (e.g., in the Code of Conduct):

- Compliance to laws and regulations, both national and international, e.g., regarding human rights or intellectual property rights;
- Business integrity, which refers, e.g., to being selective about which partners to work with, clients to work for or which topics to work on;
- Scientific integrity, which refers, e.g., to duty of care, reliability, verifiability, impartiality and independence;
- 'Society and ethics', which refers to the role of TNO in society (overlap with Societal Engagement), e.g., regarding sustainability;
- People and organization, which refers to the work floor of TNO, e.g., to creating a safe working environment, management driven by quality and competences, and treating each other with respect (overlap with Gender Equality).

To find out about barriers and enablers, we have focused on one specific goal for Ethics: the goal to develop and introduce a 'Societal and Ethical Impact Toolkit' for business development and project management—which combines the goals 'Ethical and Societal Issues tool' of Ethics and 'Societal Impact' of Societal Engagement (JERRI D3.2: pp. 20-21 and 24-25):

There are two other goals that TNO plans to work on in the JERRI project: the development and implementation of a training/game to facilitate the further development of moral capabilities; and the development and implementation of an e-learning module for scientific integrity (JERRI D3.2). However, the work on those goals had not yet started, so it would be hard to discuss barriers and enablers for their implementation and institutionalisation. At the end of the section, we will try to draw more general conclusions, based on this example.

A first step in the identification of barriers and enablers for Ethics, is the identification of relevant elements in ‘deep institutionalisation’ of Ethics (see Introduction, and JERRI D1.2 Deepening ‘Deep Institutionalisation’: pp. 3-4):

- **The internalization of values;** the Toolkit is meant to promote and foster the following specific values:
  - Anticipation (anticipate potential issues and potential impact);
  - Reflection and deliberation (of these issues and impact);
  - Precaution and care (to cope with these issues);
  - Responsibility and accountability (to explain how you deal with the issues, and being able to communicate this to stakeholders and the public).
- **The setting of normative goals;** the following normative goals were set:
  - The Toolkit is applied in 4 projects (as a prototype), and the people involved evaluate its usefulness with a 4 (or more) on a 5-point scale;
  - The Toolkit is presented to 50 business developers (of total 130) and 50 project managers (of total 200), including basic instructions for using it;
  - Implied is the following goal: In TNO business developers and managers of (larger, complex, sensitive) projects are able to identify societal and ethical issues, discuss these, and make accountable decisions—and they can do this systematically and carefully by using the Toolkit.
- **Governance;** this goal is associated to one specific intervention: the introduction of a Toolkit. Maybe the Toolkit can complement (or replace) one or more tools that are currently available in TNO (e.g., a Checklist complexity project, a Societal Impact Assessment Tool (from 2014, update in 2017), a policy for research on human subjects, an initiative for data protection and privacy). Please note that for deep institutionalisation, it is often required to align and integrate multiple governance tools.

We organized the following interactions to identify and discuss barriers and enablers related to this specific goal:

- A workshop with four influencers in TNO on ‘Ethics in Data Innovation’: two research scientists; a coordinator of a research team and a director of research (16<sup>th</sup> October 2017);
- An interview with a research scientist/project manager (7<sup>th</sup> November 2017), with a focus on barriers and enablers for the introduction of the Toolkit;
- An interview with the programme manager for Innovation for Development (21<sup>st</sup> November 2017), with a focus on barriers and enablers for the introduction of the Toolkit.

In these interactions, we presented and discussed first versions of the Toolkit, which is partly based on the work done in the SATORI project (CEN, 2017a; CEN, 2017b).

## Barriers

Based on these interactions, the following barriers were identified for the introduction of the Toolkit:

- There are several rather general barriers that tend to favour the current ways of doing things—barriers related to a general **resistance to change**, e.g., ‘We don’t need anything new’ or ‘Not invented here’;
- There are **many topics competing** for people’s attention within TNO (as in any organization), so people tend to favour topics that are ‘need to have’, which is a barrier for the Toolkit, which is seen as ‘nice to have’;
- There is a sentiment within TNO that tends to perceive Ethics as ‘**not part of the core business of TNO**’ or ‘not exact science’ ... this is a barrier for the Toolkit;
- There is a sentiment within TNO against extra **administrative burden** (‘yet another checklist’), and people don’t like the **compliance-feeling** of the Toolkit (‘yet another list of criteria I need to assess and comply to’, top-down control, lack of trust); in addition, there are questions about how to introduce it: either you make the Toolkit optional, then there is the risk that nobody will use it; or you make the Toolkit mandatory, then there is the risk that people will ‘tick boxes’ mindlessly;
- The Toolkit is associated with ‘saying no’ against specific clients or topics (e.g., because the Toolkit will say they are ‘unethical’); this brings the **risk of missing or losing projects** and the associated revenues, which is a barrier.

While discussing the potential and practical usage of the Toolkit, we identified two additional barriers:

- There is possibly a barrier for the usage of creative or collaborative (Canvas-style, workshop-style) exercises during project scoping and definition; that is normally done implicitly and by ‘serious people’—and things ‘work’ differently in different parts of TNO (e.g., projects in the Defence and security domain in the Rijswijk office ‘work’ differently compared to projects in the Healthy living domain in the Leiden office);
- There is possibly a barrier for setting goals for a project’s impact, and monitoring the impact; once you’ve stated your ambitions, you become accountable for realizing these goals and clear communication about progress.

## Enablers

Conversely, we identified the following (potential) enablers (and benefits, of using the Toolkit, which can enable its adoption and usage), which would facilitate the introduction of the Toolkit:

- If using the Toolkit would give clear and **immediate benefits**, e.g., being able to make better quality decisions, or improving accountability of decisions made;

- If using the Toolkit is relatively **easy** and brings **no additional difficulties or complexities or risks** (people tend to avoid difficulties, complexities or risks);
- If using the Toolkit would help to **speed up or streamline** processes of business development and project management, e.g., bringing people with different backgrounds around the table for the scoping and defining of a new project, negotiating with clients and partners; that would help;
- If the toolkit is innovative/well-thought-of, then people would be proud to show it to other organisations ('show off') (maybe make it available in the form of an app);
- If we can convince several influencers within TNO of its practical benefits, then they will start using it, then people might be keen to start using it as well;
- Regarding the Toolkit's presentation: it would help if it is **visually attractive**, e.g., it if starts with a Canvas-style workshop-style exercise, with colours and icons, and has a nice name (e.g., 'Impact Canvas'), and 'checklists' later-on in the process.

Moreover, while discussing the Toolkits potential and practical usage, we were able to articulate the following specific recommendations for its development and presentation:

- Start with an 'Impact Canvas' (like a 'Quick Scan'), which helps to scope and focus the project, and to set a 'mission' for the project (a creative and collaborative way of working).
- Then provide several 'Checklists', e.g., a threshold analysis (to assess how large, complex or sensitive the project is, and whether extra work is needed), and, only if needed, recommendations to obtain additional advice from experts within TNO (while keeping in mind that people at TNO are experts; they do not want to be talked down to).
- During the project's execution, provide tools to monitor and assess progress regarding the project's (desired) impact, referring back to the ambitions discussed in the Impact Canvas.

### Conclusions and recommendations

Based on this one example (working on the Toolkit), we can also draw more general conclusions about barriers and enablers for the institutionalisation of Ethics.

On the one hand, the institutionalisation of Ethics requires the implementation of various governance tools, like the ones already implemented (an Integrity Platform, an Integrity Commission, an Integrity Officer, the Code of Conduct). **These are relatively 'hard' elements in institutionalisation in that they relate to formal roles, tasks, responsibilities and processes.** On the other hand, it would require the internalization of the following values (adapted from Owen, 2013: 38): Anticipation (e.g., to anticipate potentially problematic issues); Reflection (e.g., to learn from incidents); Deliberation (e.g., to ask questions, to have dialogues); and Responsibility (e.g., to be accountable). **These values are relatively 'soft' elements in institutionalisation in that they relate to people's informal, implicit, intrinsic thoughts, feelings and motivations.**

In terms of barriers and enablers, we can see a need for balancing these ‘hard’ elements and ‘soft’ elements (for the institutionalisation of Ethics):

- On the one hand, having no (‘hard’) formal processes would be a barrier, whereas, on the other hand, having too many (‘soft’) formal processes can also become a barrier; thus, having a right balance, and having formal processes that ‘work’ would be an enabler.
- It would be an enabler if people have (‘soft’) intrinsic motivations for ethics, but having (‘hard’) external mechanisms, which demand that people express their motivations can be a barrier; therefore, enabling people to voice their motivations would be a right balance.

## 2.2 Barriers and enablers for Gender Equality (Diversity)

In this section we describe enablers and barriers, as well as recommendations for the institutionalisation of Gender Equality within TNO. In the JERRI project, several specific goals for Gender Equality (with associated activities, such as the Implicit Bias Training and the Female Talent Database) have been developed (JERRI D.3.2: pp. 14-17):

1. Removing barriers to the recruitment, retention and career progression of female researchers;
2. Addressing gender imbalances in decision making processes;
3. Strengthening the gender dimension in research programs.

For the current deliverable, we invited change agents to express their ideas for institutionalizing Gender Equality within TNO, without influencing their opinions with ‘our’ ideas, i.e. the ideas that were previously articulated in the JERRI project. Thus we engaged the change agents to think about the enablers and barriers on the road to achieving these goals, and to propose recommendations of how these enablers could further be supported and barriers minimised on the road to achieving our Gender Equality goals.

A first step in the identification of barriers and enablers for Gender Equality, is the identification of relevant elements in ‘deep institutionalisation’ of Gender Equality (see Introduction, and JERRI D1.2 Deepening ‘Deep Institutionalisation’: pp. 3-4):

- **The internalisation of values;** values like Equality and Diversity are (obviously) associated with this dimension; other relevant values are: Anticipation (e.g., to anticipate the need to promote female leadership now, if you want a higher percentage of women in top management); Reflection and Deliberation (e.g., to critically question and discuss the status quo); and Responsibility and Accountability of stakeholders, in particular of research managers and HR professionals, who are largely responsible for Gender Equality;
- **The setting of normative goals:** TNO aims to have at least 30% of women at the top management level (TNO, 2016) and the Strategic Plan for 2018-2021 sets out a number of

vision goals, such as 40% of TNO employees being female (TNO, 2017).

In order to achieve the vision set out, diversity steering committee works on implementing concrete activities to turn the vision into practice.

- **Governance;** Gender Equality has the support of management and key stakeholders, most notably via the Diversity Steering Committee. Further activities proposed for Gender Equality aim to create support from the top management and form the HR department.

We carried out a number of activities and organized interviews with a mix of male and female internal stakeholders to discuss barriers and enablers, and to articulate recommendations for Gender Equality. We intentionally engaged with stakeholders with diverse degrees of involvement in Gender Equality, in order to facilitate heterogeneity of opinions. Furthermore, one external stakeholder was approached for a broader discussion of enablers and barriers for diversity and inclusion within organisation. The following interactions were conducted:

- An interview with a female research scientist and Confidential Advisor (26<sup>th</sup> September), to discuss barriers and enablers focusing on recruitment/selection and progression of women within TNO;
- An interview with a female research scientist (17<sup>th</sup> October 2017), to discuss barriers and enablers focusing on recruitment/selection and progression of women within TNO.
- An interview with a male HR employee (10<sup>th</sup> November 2017) focusing on recruitment/selection and progression of women within TNO.
- A discussion with a (female) professor with a chair in diversity from the US (24<sup>th</sup> November 2017), on barriers and enablers of equality at workplace.

The sections below discusses input from internal stakeholders, unless otherwise specified.

## Barriers

The following barriers (that hinder the institutionalisation of Gender Equality) have been identified:

- **Organisational culture;** put rather crudely ... white, older men of Dutch origin are implicitly identified as the norm, including stereotypical behaviours, like being 'proud and loud' as a way to get recognition, rather than delivering quality work (without necessarily being 'proud and loud'). This culture is not comfortable for non-dominant groups within TNO. Currently, only a small proportion of females appears to be able to break through this dominant culture and to reach higher positions. It has also been recognised that a change of organizational culture takes time and cannot not happen overnight.
- **Implicit bias;** there is a general and shared belief that TNO provides equal opportunities to all; the numbers, however, seem to indicate existence of implicit and unconscious bias.
- **Lack of awareness;** e.g., of the ways in which the current organisational culture shapes recruitment, selection as well as progression of female employees within TNO by some

research managers (RMs) and HR employees is identified as a barrier. And lack of awareness on the part of RMs that there are diverse leadership styles, and that diverse leadership styles can be equally successful or effective. For example, women tend to prefer participatory leadership styles, and ascribe achievements to group efforts, rather than highlighting one's personal role in achieving results, which is not valued as highly as more directive, leadership styles.

More specifically, the following barriers to recruitment and selection of female candidates have been identified:

- **Operational barriers:** New policy change on having at least one female interviewer in the selection committee puts a strain on the agenda of a few females in top positions. Furthermore, in some fields there is a perceived challenge to identify at least one female candidate to apply for a vacancy.
- **The HR department** is responsible for the execution of changes in TNO practices, but it is not taken along in this process of change. What they see is an increase in workload due to changes, without being taken along the path of why it is important to make the changes in recruitment. Thus, there is a concern about institutionalisation of change: How can we make sure that all the new measures are used and over time become 'business as usual'?
- Finally, becoming a parent is sometimes perceived as negatively affecting career progression for women (and not for men).

### Enablers

The following activities and events have been identified by stakeholders as enablers for promoting Gender Equality:

- Existence of the **Diversity Steering Committee**; the work of the group has been identified as a catalyst of change.
- **Instrumental support** (budget) from the Diversity Steering Committee as well as the JERRI project for activities also supports bringing about positive change.
- Involvement and support of **top management**.
- Gender Equality (Diversity) is increasingly recognised as a **relevant topic** within TNO (e.g. the Strategic Plan includes policies to employ more female talent (p. 55)) and is being increasingly **discussed**, e.g., on the Yammer online discussion platform, in the Female leadership courses, and the HR Diversity Steering Committee member discusses regularly with recruiters on diversity issues.
- **Monitoring of figures**; helps to monitor progress and to assess any gender inequality gaps. The HR department is developing a Dashboard, which will include Gender/Diversity figures. The Diversity Steering Group shares these graphs via its newsletter, every quarter.

## Conclusions and recommendations

Based on these findings, stakeholders articulated the following recommendations for recruitment/selection of females and their progression to higher decision making positions:

- Organise **implicit bias training** for RMs as well as HR department employees who deal with recruitment and selection process.
- Engage with **HR professionals as discussion partners** in change process, so that the changes in policy can be executed with internal motivation for it.
- Keep **monitoring gender equality figures** (proportion of females at different positions, total proportion of women at TNO, examine salary (in)equality).
- Keep support women within the organisation to stand up for themselves more (via e.g. **female leadership programme**).
- Make **changes in the way performance and evaluation talks are carried out**. Ask about ambitions differently, RM to support women in advancing even if they are not able to ‘sell themselves’ and if they have different leadership styles.

Specific recommendations for recruitment and selection of female talent:

- Create, continuously update and use a (female) **talent database** that can be used by recruiters and RM when looking for suitable female candidates. Updating the database could be a part of yearly SPP procedure.
- Use **gender neutral recruitment language** when advertising for new positions so that vacancy text is more appealing to female candidates.

Finally, an external stakeholder recommended to make a **focused approach to change**: identify a part of organisation on which to focus when wanting to promote gender equality. Based on input of all participants, this focus appears to lie at HR department and management of TNO.

The recommendations suggested by stakeholders overlap with activities identified earlier in the project (JERRI D3.2, e.g.,: Implicit Bias Training; Female Talent Database), but also provide other relevant suggestions for activities that should be executed in the next phase of the Jerri project.

## 2.3 Barriers and enablers for Societal Engagement

Societal Engagement is an integral part of TNO’s organizational culture. It has, however, a relatively low level of maturity (‘repeatable, e.g., documented’); the only formal elements of institutionalisation are the Strategy Advisory Councils. The TNO-Law (TNO, 1930/1985) requires that each Unit of TNO (‘Instituut’ in Dutch) has an Advisory Council. Therefore, we will focus our discussion on these Strategy Advisory Councils. Moreover we will focus on the goal to involve



societal stakeholders, e.g., NGO or civic society organizations, in the Strategy Advisory Councils of TNO (see JERRI D3.2: p. 24).

Please note that there are two other goals for Societal Engagement that the JERRI project intends to work on: the development and implementation of a ‘Societal Impact Toolkit’—this was combined with the Societal and Ethical Impact Toolkit and discussed in the section on Ethics; and the wider communication of ‘best practices’ in involving potential users in research and innovation projects—the work on this goal has not yet started so it would be hard to discuss barriers and enablers for its implementation and institutionalisation.

Due to the restructuring of TNO as per January 2018, nine new Strategy Advisory Councils will be created, partly re-using the current five Strategy Advisory Councils. This goal is also associated to Gender Equality / Diversity since the ambition is also to include more female members and more younger people in the Strategy Advisory Councils (there is currently a strong bias towards men and towards older people).

A first step in the identification of barriers and enablers for Societal Engagement Ethics, is the identification of relevant elements in ‘deep institutionalisation’ of Ethics (see Introduction, and JERRI D1.2 Deepening 'Deep Institutionalisation': pp. 3-4):

- **The internalization of values;** the creation/modification of the Strategy Advisory Councils is meant to promote and foster the following specific values:
  - Anticipation, reflection and deliberation; to identify and discuss societal issues (more) adequately.
  - Inclusion, engagement and participation; to organize these processes of anticipation, reflection and deliberation.
- **The setting of a normative goal;** first, the TNO-law requires that each Unit has an Advisory Council; second, there is the recommendation to invite representatives from government, industry, academia and societal organizations for these Advisory Councils; third, there is the goal of the JERRI project to include one or two societal stakeholders in each (new/modified) Strategy Advisory Council.
- **Governance;** this goal is associated with one specific tool: the Strategy Advisory Councils of TNO—and especially their composition. Please note that for deep institutionalisation, it is needed to align and integrate multiple governance tools.

We organized the following interactions to identify and discuss barriers and enablers related to this specific goal:

- A meeting with the strategy managers of the nine new units, from the Strategy department of TNO, 19<sup>th</sup> of September 2017 (with a key change agent);
- Meetings with the directors (‘kwartiermakers’) of the nine new Units of TNO, 28<sup>th</sup> of September and 19<sup>th</sup> of October (with a key change agent);

- A meeting with the strategy managers, who are also coordinators of the Strategy Advisory Councils, 23<sup>rd</sup> of October (with a key change agent).

### Barriers

At first, before these interactions, we anticipated rather general barriers:

- A resistance to change ('We don't need anything new' or 'Not invented here'), so that people tend to cling to their current ways of doing things.
- And a competition between topics in people's agendas, so that topics that are seen as 'need to have' win over topics that are seen as 'nice to have'.

These barriers 'dissolved' rather soon (between September and October 2017) when one specific barrier was crossed:

- Uncertainty about the restructuring of TNO and about who is responsible for the creation/modification of these Strategy Advisory Councils in the new Units .

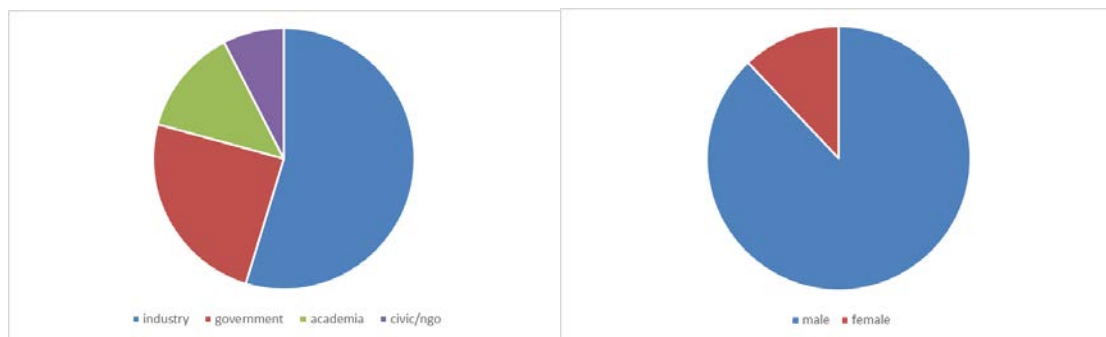
This uncertainty was removed during the meetings, with the people from the Strategy department and with a key change agent; that acted as a pragmatic advocate of the ambition to include societal stakeholders in the Strategy Advisory Councils. This change agent clarified who is responsible for the creation/modification of the Strategy Advisory Councils, and was able to motivate the people who are needed for this: the strategy managers and the directors of the Units.

It can be instructive to have a closer look at how this barrier (uncertainty, and an associated resistance to change and competition between topics) was crossed in this particular case— maybe we or others can learn from this. We will focus on several topics: the role of this change agent, the role of Terms of Reference, and the role of a visualization of the current situation:

- The Executive Board made this change agent responsible for the establishment of new Terms of Reference for Strategic Advisory Councils, based on legislation ('TNO wet') and on best practices from TNO (strategy managers and directors) and the chairs of the current Strategic Advisory Councils. The directors are responsible for finding a chair and together they will select the other members of the Councils. The executive board approved new Terms of Reference (13<sup>th</sup> of November) regarding the newly to be formed Strategy Advisory Councils, with the explicit advice to organize the Councils in such a manner that they can provide a broad (cross-sectorial, societal) perspective for critically questioning and challenging the work of TNO.
- The Terms of Reference explicitly advice to create a "good balance between business, academia, government and societal organizations; especially societal organizations are currently underrepresented. Because of TNO's mission and ambition to contribute to societal challenges (e.g., the UN Sustainable Development Goals), it is emphatically recommended to explore the possible inclusion of societal organizations". Furthermore, it

is recommended to create a good balance between men and women, “in line with the ratios [man to woman] in the Council’s domain”, and to have different age groups represented. There is, e.g., the idea (not for now, but later on) to invite young people from an organization that specializes in putting young people in advisory councils. The terms of reference are not compulsory, but there are first signals from directors that they want to include societal stakeholders in their new Strategic Advisory Councils.

- Moreover, it is interesting to note that a set of graphs were very helpful in raising awareness about the composition of the Strategy Advisory Councils, and creating a sense of urgency to change this: a graph that plots the 58 member of the five Strategy Advisory Councils into their affiliations (industry, government, academia, NGO/ civic organization Pre-2018)); and a graph that plots the members into gender; see *Figure 3*.



*Figure 3: Composition of the Strategy Advisory Councils for affiliation (left) and for gender (right) (based on data from the publicly available TNO Annual Report 2015)*

At this moment (February 2018) there seem to be no barriers for including societal stakeholders in the Strategy Advisory Councils.

### Enablers

Looking back, we can conclude that the following has been a key enabler:

- The development of clarity about the responsibilities for the creation/modification of the Strategy Advisory Councils in the new Units—this clarity did legitimize change and made the composition of the Strategy Advisory Councils ‘need to have’. When the composition of the Strategy Advisory Councils becomes a formal requirement in the terms of reference.

We will see in the first six months of 2018 how things work out: whether the Unit Directors are able to attract and include societal organizations into the Strategy Advisory Councils, whether the executive board will steer their compositions. During that process, other enablers or barriers may emerge:

- Introducing more diversity, e.g. by including societal organizations and/or more women or younger people, may pose challenges in communication—it may even lead to conflicts or a perception of TNO as less independent and damage its reputation;
- Or the other way around: diversity in composition may improve the communication—which is at the core of the reason why the Strategy Advisory Councils were installed in the first place: to mobilize diverse viewpoints, yielding better quality decisions.

### Conclusions and recommendations

Based on this one example (including more societal stakeholders in the Strategy Advisory Councils), we can also draw more general conclusions about barriers and enablers for the institutionalisation of Societal Engagement.

We started this section with the statements that, on the one hand, Societal Engagement is an integral part of TNO's organizational culture, and, on the other hand, that there is relatively little formal tasks, roles, responsibilities or processes in place for institutionalisation. The role of the change agent was very relevant in establishing the new 'status quo'.

Looking at this example, we saw that several general barriers (resistance to change; competition between topics) dissolved as soon as there was certainty about roles and responsibilities. We can thus speculate that, in order to promote the institutionalisation of Societal Engagement, we only need to create clarity about roles and responsibilities, and then people will follow their intrinsic motivations. Clarity is thus a key enabler.

Another speculation is that we do not need more (or complex) processes, but rather less (or simple) processes. Too much stress on processes ('hard' institutionalisation) can even become barriers. Probably, the cultivation of people's intrinsic motivations ('soft' institutionalisation), e.g., to 'do good', will prove to be another key enabler.

## 2.4 Barriers and enablers for Science Education

This section deals with the current way of working with the RRI Dimension of Science Education. Based upon three interviews and two specific activities<sup>1</sup>, we sketch a picture in where we depict how we got where we are, how we experience this and what inhibits us and what enables us to

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<sup>1</sup> One activity was the Open Day of TNO during the National Weekend of Science on the 7<sup>th</sup> of October and a repeat event in one location one week later (approx. 2.000 participant total), the second activity was the preparation and execution of a two day workshop for secondary education in Delft on the 14<sup>th</sup> & 15<sup>th</sup> of November, in which TNO participated. The JERRI project team assisted in setting up the cases and partially attended these events.

take next steps. The starting point is D1.2 State of Art TNO and the goals that were developed in D3.2.

The current level of institutionalisation (as could be found in D3.2 in the assessment of the maturity level p10.) is considered rather low. Based on this we see that:

- The **internalization** of specific societal values and the embedding of these values in practices in the organization is not fully integrated;
- The **transformation** towards specific normative goals is achieved during the goal setting; a more quantitative goal has been set in D3.2 for this dimension;
- The beginning of **leadership support** is showing; specific activities aimed at wider participation of the general public (participation in the national weekend of science) have found wide support both in terms of enabling this event to take place as well as participation by change agents;
- The execution of this event and other events aimed at secondary schools has been enabled by **creating clarity about roles, tasks, responsibilities, processes and structures**, thanks to the M&C project team and support of JERRI project.

Since the start of the project, through the workshop that has been held and through the execution of several activities, we have developed a better and wider understanding of the challenge at hand. To recapture this shared starting point we repeat where we stand at the moment:

Sciences Education is considered a secondary activity (not a need to have, but a nice to do); There is clear distinction between employer branding (Marketing and Communication, and Human Resources) and other types of activities that can be considered part of science education, such as informing the general public about science, technology and innovation, or citizen science (involving citizens in conducting research). The first is organized and structured, and has normative goals, a clear vision and budgets and activities directed towards achieving these goals. The latter is in a different state:

TNO is in 'a long game' when it comes to engaging (future) stakeholders. We currently engage in (unstructured/ad hoc) specific activities aimed at students in secondary education, students at universities and/or organize activities such as open days at locations for a wide range of stakeholders. The immediate pay-off is limited; hoping that students choose those studies that will ultimately reap (after great lengths of time) benefits for TNO (as an employer), or create wider brand awareness of the 'brand' TNO. It could be argued that this is a contribution towards a 'greater good' as more organisation are making contributions. This is a strategy that has an uncertain return on investment (other than recruitment from universities). The current activities are part of programmes and activities run by Marketing & Communications and are considered a cost (as it has no direct financial return) and as a contribution to society (create more

awareness for the role of science and innovation, create goodwill/brand building for TNO). They are vulnerable in terms of funding, although relationships and networks with strategic partners have been kept intact since long time.

### Barriers

- Science Education focused on primary/secondary education is seen as a cost, with only a limited direct return. In the interviews we find a rather narrow scope for Science Education; focusing on specific age groups, STEM professions and future employees. We do not find a structured way of including Science Education throughout projects (in a model where we aim for so called quadruple helix-projects in which science education can be a pre-requisite) or a motivation to invest in the greater good that is supported by strong leadership.
- Other types of activities aimed at the general public are considered part of Marketing & Communication; which has a different aim (generate impact through visibility, brand awareness, not to 'educate' and create understanding.
- Programmes executed that could be attributed to Science Education are seen as a nice to have, not a need to have or do.
- Lacking is wider concept of why, as an organization, we engage in these type of activities and why this is needed in the narrative that we have set ourselves as a goal (Narrative F: R&I With/for Society). In this narrative we engage with all actor groups relevant to the problem or challenge we have set; Science Education brings about or helps to engage in a (more) meaningful and effective way to prepare these stakeholders to interact and value their contributions. The investment into the 'greater good' has not been publicly advocated, and clearly we have a legacy of initiatives that have been shut down (as been described in D1.2 State of Art).

### Enablers

- "There is a good reason for people to be enthusiastic /motivated and to tell others about their work and projects, to a degree, this is self-regulatory; enthusiastic staff tell enthusiastic stories to their children/friends and direct environment" tells one interviewee.
- How the organization helps to facilitate this exchange with stakeholders is key. Where and to whom to speak to are crucial in this respect. Usually it takes time to make staff available for specific events and often different events have different target groups. "It helps if there was a certain set of cases/examples for specific target groups (stakeholders relates to age, education level or interest), this would make our work a lot easier", he\*she continues.
- Asking for tips, she says that "younger persons, who can relate better to specific age groups, helps to convey our messages better." From a M&C perspective, budget and time

is made available for employer branding purposes. This is a direct result of difficulties in recruitment in specific areas where new and creative ways are sought to engage with more and more stakeholder groups to find suitable staff.

### **Conclusion and recommendations**

Activities that fall in the category of Science Education that are deployed are to a degree still ad-hoc and unstructured, or done as usual. TNO could benefit from a wider strategy where we, as an organization, state why we pursue these activities. Organisational sense making could occur and legitimization of activities as part of a plan would contribute to the necessary contingency required for structured activities in this field, and would form the basis to engage with other professionals in TNO. Support from leadership seems key here. This could help to overcome low rates of response (out of 200 trainees/placements only four showed an interest to participate in an event in November 2017 for secondary education).

Drawing (positive) attention to TNO (as an organization) is also a double-edged sword; we can expect a wider interest in TNO, create goodwill in society, but on the other hand; drain valuable time and resources from our organization in organizing these activities and responding to queries from these stakeholders. Yet, in the long term, it is expected that we benefit from this wider /inclusive engagement. The benefit is expected specifically if we use a more inclusive approach beforehand, engaging with stakeholders throughout the project, when the benefit is reaped at the end of a project when the solutions is better understood and appreciated by a wide variety of stakeholders.

One key question therefore is how do we effectively manage time and resources for these current type of activities, create external expectations that can be met by our organization and at the same time; create an institutional logic why it is important to play this 'long game'. What can reasonably be expected from TNO?

One interviewee was blunt about this; the system we have (based on our operational way of working) is not geared towards spending time on this type of activities. Our operational way of working gives results that are rewarded; if science education is not rewarded as such; you will not be tempted to invest time in the activities (fitting with the scope of science education

Several recommendations have been given where the most urgent one deals directly with the required link to an institutional logic; build a solid base and vision for Science Education. This would then enable to:

- Promote the idea that Science Education is a must for TNO in the long term; Have change agents and leadership endorse this message;
- Exchanges visions about Science Education between peer-organisations to allow mutual understanding and

- To allow time being devoted to Science Education and report back on how we have created impact. Several internal discussions have stretched this point; ideally you would like to built-in time for reflection about ethical behaviour, safe working conditions, and time to promote your work etc.; this is not yet part of the current 'reward' system; it is not a KPI that can be answered quantitatively; but more in a qualitative manner.
- Have standardized responses to request for contributions for specific stakeholders to meet these requirements effectively;
- Engage with clients in discussion about the set up of inclusive projects (quadruple helix) where science education can be a pre-requisite.

## 2.5 Barriers and enablers for Open Access

This section describes: (i) the current status of the RRI Dimension Open Access of TNO, (ii) the opportunities that are being seen to further embed this topic in TNO and (iii) the barriers that are experienced by change agents. The starting point on which we build upon is D1.2 State of Art TNO and the goals that were developed in D3.2.

What became clear at the inception phase, and what still appears, is that the dimension of Open Access (OA) is relatively less well institutionalized within TNO than most other RRI dimensions. The feedback received from stakeholders and advisory board members argued that the topic is as much a cultural change process for TNO as a mission oriented change, that needs to be supported. The goalsetting process therefore focused on consulting internal change agents and bring them together to share and discuss their views on Open Access.

The current level of institutionalisation is considered relatively low (as could be found in D3.2 in the assessment of the maturity level p10.). Based on this we see that:

- **Internalization:** from various angles from the organization questions are asked about the Open Access Policy and related topics like the publication policy and the IP policy. Especially among researchers there is already an increasing awareness of the importance of OA. Perhaps even more than in the management levels, which have a broader agenda than the scientists themselves: they are often concerned about IP.
- **Transformation:** as said, there is an increasing attention for OA within the organisation. However, besides this transformation in attitude towards the subject, there is also a need for a transformation to a new structure and publication policy, and that is only now being given shape. The transformation to specific normative goals for OA has not yet been achieved during the setting of goals, but it has started the process to do so. The JERRI project is effectively enabling this transformation.



- **Leadership support:** there was hardly any, but it is now slowly starting to come. However, the management is still divided in those who see the benefits and necessity of OA and those who are afraid of the possible negative effects on our current business model.
- **Clarity about roles, tasks, responsibilities, processes and structures:** most of the current OA initiatives (as far as now clear) are still developing separately, organized sometimes from the bottom up, sometimes from above. Especially in the research groups, there is a lack of clarity how to deal with openness and closeness of information for the knowledge building phase, knowledge exploration and knowledge valorisation phase. There is no clear overarching coordination for OA.

Nowadays there is a social demand for Open Access to general results. It should be noted that in the current situation, TNO broadly meets this requirement which is shown in a recent analysis of scientific output over the last eight years at TNO—see Figure 4. On the horizontal axis, the year is plotted (year 1 is 2010). On the vertical axis the percentage of OA articles (red) and of all OA publications in the repository (blue) is given as a percentage of the total amount of publications.

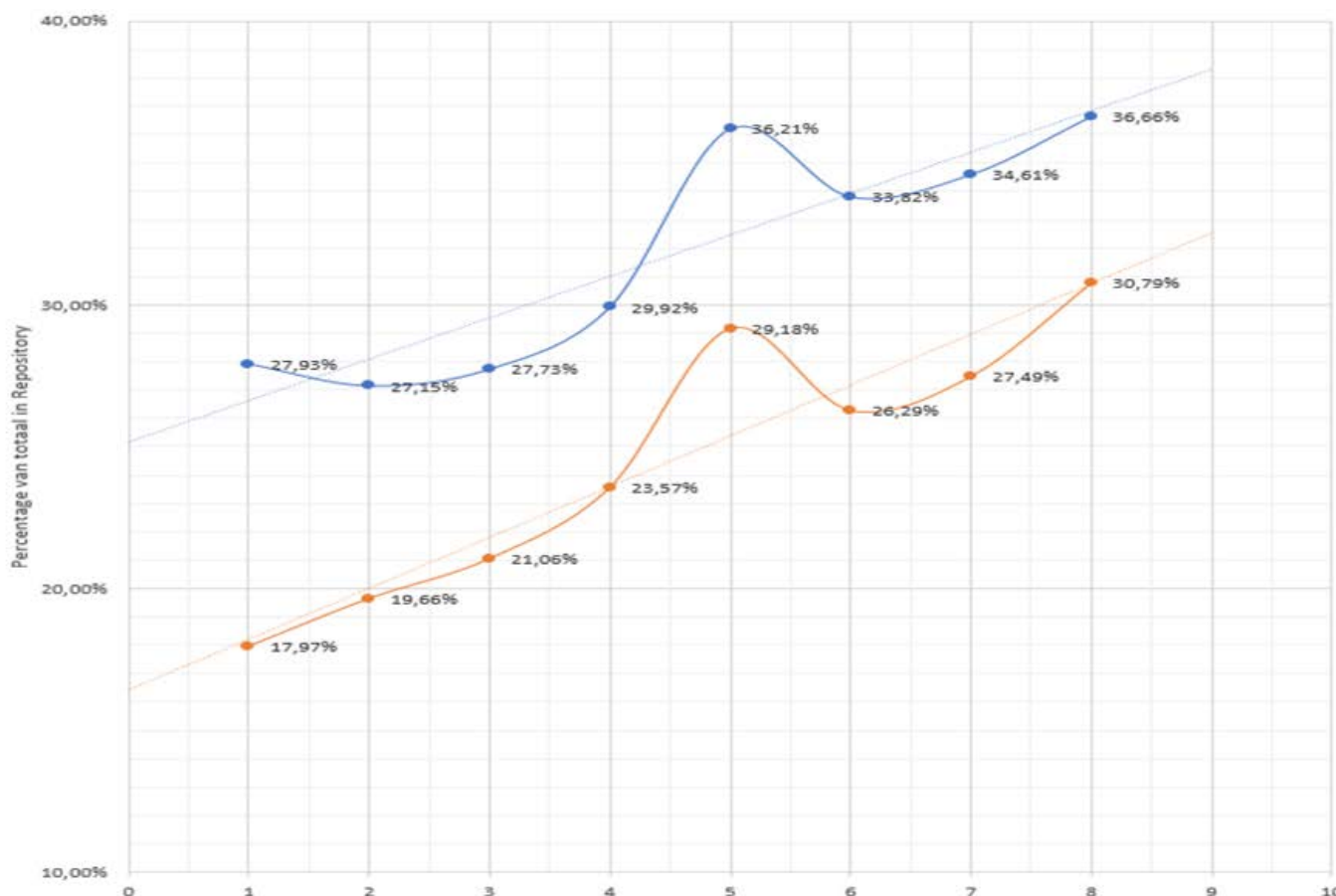


Figure 4: Scientific output and Open Access at TNO (2017)

In this analysis, the Open Access component accounted for 18 percent of all publications in 2010, while the 2017 data indicate 31 percent. This continuous growth is due to both top down and bottom up initiatives in the scientific TNO community and staff. It must be noted that this growth has been achieved without a central policy on Open Science. When this policy comes about, it may well have both positive and negative effects on the growth of Open Access at TNO. We believe however that the positive effects will prevail; this autonomous growth is likely to be independent from internal policies.

The main contribution of the JERRI project so far is that we are now aware of this OA trend in TNO, and the need to make a policy (legitimization). The management at TNO has become more actively involved in the OA discussion and finally a policy is now almost at hand. This will stimulate OA in TNO in a 'responsible' way.

In order to identify barriers and enablers to foster organisational change towards responsible Open Access practices, we have organised a workshop with ten internal change agents i.e. people from different angles of the organisation (Intellectual Property & Contracting, policy and legal, research and publication, and patents), who have a vision on how to initiate this change responsibly.

- Workshop Open Access, 5<sup>th</sup> of October 2017, the aim of the workshop was to create a picture from different angles to identify the barriers and possibilities when it comes to Open Access; and jointly explore which actions TNO should take in this area.

Afterwards, we also organized interactions with members of the department of Intellectual Property & Contracting by asking specific questions and obtaining background documentation.

## Barriers

The following barriers have been identified:

- **Lack of policy** to give framework to how to deal with openness and closedness of information for the knowledge building phase, knowledge exploration and knowledge valorisation phase. Affiliated questions are, 'how should TNO deals with IP and know-how, and how this should be organized?'
- **Lack of a publication policy** with enough transparency and communication power to reach all TNO scientists. Therefore, the OA dilemma confronts TNO with a more fundamental question: what information should be made public, and what not? And who is responsible for this, the manager or the scientist?
- **TNO is a mixed funded applied research organization**, which is both publicly and privately financed, covering a wide scope of activities ranging from pure contract research for private enterprises; security-related research requiring a specific access regime, to EU funded collaborative R&D projects. The nature of these activities is so divergent that a single OA policy would not be practical.

- **Research at TNO varies strongly between focus points** like healthcare, energy, home-land security, automotive industry and nanotechnology. Each with its own public or private client base, and client- or industry specific contract clauses. Based on these clauses, different sets of rules and procedures have been put in place. They deal with the ‘openness’ of the research results, or simply put: which info can be made publicly available, outside TNO, and which cannot. Due to the **great variety of sponsors, sectors, clauses and funding formulas**, the rules and procedures vary as well. As a consequence, policies in place are not always unambiguously or clear, and scientists can be hesitant about publishing their TNO efforts at all.
- **Lack of funding** for green of gold route initiatives within the financial context of a scientific project proves often a real barrier.
- Barriers related to the **business model of TNO** that need to be addressed. TNO follows the so-called Open Innovation (OI) business model; this model stands for ‘value creation and value capture’ and does not imply ‘free to all’. From that perspective, OA can be a barrier for the OI model because:
  - Only part of the costs of TNO-research are directly public financed while there are usually also specific users of a particular study.
  - If there are commercially viable results, then by definition there is a market. And thus real or potential other providers. If TNO would offer its results to users free of charge, there is a chance of crowding out other market players. Naturally, TNO cannot use public funds for this.

### Enablers

- As stated earlier, there is a **social demand** for Open Access to general results and TNO broadly meets this requirement. An enabler for this is that TNO already has an open access policy approved by the Executive Board in the sense that reports for which no commercial interests are attached and which do not contain confidential information are disclosed to the general public in a partnership with the TU Delft. With regard to Open Access on scientific publications, by definition, this knowledge is revealed and usable for follow-up research by third parties<sup>2</sup>.
- The call for publication in Open Access magazines is getting louder in the scientific world. TNO does not yet have a formal policy in this area, but in practice it conforms to the **requirements of subsidy providers** for example in the framework of Horizon 2020. Various models have emerged to support open access publishing. This can be done roughly in two ways:

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<sup>2</sup> Teernstra, Folkert J.M., Memo explanation open access, TNO (IP&C), 4 juli 2017

- **Golden Route:** Some journals contain only open access articles whereas others, known as hybrid journals, may offer a mix of open and subscription content. In both cases, there are costs associated with publishing which need to be met. These costs, usually paid through article processing charges (APCs), may be paid by authors, the publishing research institution or subsidised by a third party such as a funding council. The article is made available immediately. These costs now vary from 0 to 5000 Euro per publication, depending on the impact ratio and the review process of the magazine
- **Green Route:** Green open access involves publishing in a traditional subscription journal as usual, but articles are also 'self-archived' in a repository (institutional or external subject-based repository) and usually made available after an embargo period set by the publisher. No charges are paid.

As shown by the TNO statistics on Open Access, for many scientists it's an enabler to look for funding of the golden or green route to publish Open Access articles within the financial context of their scientific projects. In addition, the TNO database, as hosted by the TU Delft university and harvested by Narcis.nl, is a successful TNO staff initiative and also an enabler that has opened up a fully golden route for TNO Open Access publishing. In the case of TNO, we have found out, for instance, that 14% of our users are Chinese and only 9% are from the USA.

- Another enabler which is mentioned; make a clear decision who is responsible from the Executive Board for OA with mandate for the formation of the working group that must draft an Open Access Policy. This OA working group has been set up during the setting of goals in the JERRI project. Stated by a workshop participant: "I think the topic of OA should be supported by the 'top' management with the support of a few largest units. If we realize that, it will work!".

## Conclusions and recommendations

The following recommendations have been made:

- The Council of the European Union has underlined that research data originating from publicly funded research projects could be considered as a public good, and encourages to set optimal reuse of research data as the point of departure, whilst recognising the needs for different access regimes because of Intellectual Property Rights, personal data protection and confidentiality, security concerns, as well as global economic competitiveness and other legitimate interests. Therefore, stated during the workshop, the underlying principle for the optimal reuse of research data should be: "as open as possible, as closed as necessary".
- Developing an Open Access Policy; "developing an Open Access Policy, which is related to the IP policy, requires coordination and a project-based approach", as stated by a workshop participant. In current OA initiatives, there is little consideration for IP issues.

Making a TNO-wide policy for this requires a project-based approach, since all relevant stakeholders and governance levels have to become involved. It also requires coordination, especially of the communication component of this project. All too often, a policy exists, but is not made known to all scientists.

- It's a recommendation to create your own Golden Route by setting up your own website. However, extreme care must be taken to avoid that Intellectual Property of TNO or private funding partners is jeopardised in this way. The check is still made on individual basis, and not on a common TNO Open Access Policy. There is no suitable solution for this at the moment.
- Recommendations related to the business model of TNO that need to be addressed:
  - TNO is an applied scientific institute as a linking pin between academia and industry. TNO thereby adopts fundamental knowledge, especially developed at university level, and makes it usable for industry. The latter requires investments from industry and therefore TNO acts within the business paradigm of the industry. The value of TNO's knowledge of the business sector is determined to a considerable extent by the extent of its exclusivity or by a lead over time on competitors. TNO must therefore ensure that imposed and unbalanced Open Access obligations endanger this role as a linking pin to the industry.
  - The research that is carried out with public money must be placed very carefully in the outside world because free distribution can mean that other countries receive information that penalizes the Netherlands, while they have not contributed to the development of knowledge. This leads to a complicated and in a sense contradictory situation. The recommendation to manage this issue, is to make a selection of IP related documents to exclude from OA. Once that is implemented in the workflow of publications, full support on Open Access from management becomes possible.

### 3 Barriers and enablers for institutionalizing RRI at TNO

By looking at the different barriers and enablers for different dimensions of RRI, we are able to see several patterns. Although each dimension has its own maturity level and specific interest groups and change agents we must also consider the organisational culture that forms the basis for many underlying motivations; these appear as barriers or enablers. In the sections below, we will discuss several patterns that recur across the different dimensions.

#### 3.1 Internalization of values

Regarding the internalization of values, we see a range of values appear for the various dimensions, e.g.,:

- Anticipation, Reflection, Precaution and Responsibility (for Ethics);
- Equality and Diversity (for Gender Equality);
- Inclusion, engagement and participation (for Societal Engagement);
- Have a long-term orientation, mission driven (for society) (for Science Education);
- Freedom and free access to science versus business interests and protection of IP (for Open Access).

The observation that different values are needed for different dimensions of RRI can be seen as a barrier for the institutionalisation of RRI, because the communication (both inside and outside TNO) would need to be more complex: “*We focus on <many different values> for <different elements of> RRI*” is a more complex message than “*We focus on <one or two> values for RRI, as a whole*”. On the other hand, reality requires us to focus on this or that value for this or that element of RRI (e.g., anticipation in Ethics; equality in Gender Equality; inclusion in Societal Engagement). In that sense, the diversification of values, for different values, can be seen as a key enabler for the institutionalisation of RRI.

#### 3.2 Setting of normative goals

Regarding the setting of normative goals, we have seen relatively SMART goals (specific, measurable, ambitious, realistic, time-bound) during the goal setting process of the JERRI project, e.g.,:

- For Ethics: To apply the Societal and Ethical Impact Toolkit in 4 projects and to present it to 50 business developers and 50 project managers;
- For Gender Equality: To have at least 30% of women at the top management level of TNO;
- For Societal Engagement: To have at least one societal organizations in each Strategy Advisory Council;
- For Science Education: To have a set percentage of online content in TNO Time;
- For Open Access: To have a formal policy in Q3 of 2018.

This way of articulating (SMART) goals can be seen as an enabler; in order to get things done (to explore, develop, try-out, implement), one requires budgets. And in the business reality of many organizations, including TNO, having a clear plan, with clear (SMART) goals, is a necessary requirement for obtaining for budgets. Thus, it is obvious that the availability of a budget ('the elephant in the room') to fund activities is a key enabler for institutionalisation.

### 3.3 Governance

Regarding governance, we see relatively isolated instruments for the different dimensions:

- Ethics: The introduction of a Toolkit for Business Development and Project Management;
- Gender Equality: Policies for hiring new employees and for leadership development, in HR;
- Societal Engagement: The inclusion of societal organizations in the Strategy Advisory Councils;
- Science Education: Various initiatives for Employer branding and for informing the general public;
- Open Access: the installation of a Platform Open Science; and the development of a policy.

This diversity of governance tools can be interpreted as an enabler, because different domains require different ('tailor-made') governance tools. This diversity can, however, also be seen as a barrier: the institutionalisation of RRI (and its constituent elements) would become easier if there were one consistent set of government instruments, e.g., being overlooked by one body within TNO. This issue will need to be explored further—also given the re-organization of TNO, and discussions about where and how to implement different RRI dimensions.

### 3.4 Trust

Many of the issues discussed above (internalizing values; setting normative goals; organizing and governance) are related to trust. There is a debate going on—both in academia and, informally, within TNO—about trust, or actually: the lack of trust. In academic terms, one can distinguish between high-trust organizations and low-trust in organizations. This is how Weggeman (2015: back cover), professor of organization science at Eindhoven University of Technology, discusses these topics:

“Managers tend to think that [R&D labs and similar organizations] and their staff must be managed like before. But to do so can create more problems than it might solve. Professionals are for the most part already motivated and do not need to be managed. They have studied many years to be able to do their job. Frustrating their enthusiasm by steering and controlling them can restrict their ability to perform to the best of their capability. In any such organization, the avoidance of forms, meaningless report writing, and restrictive rules and procedures, will lead to much greater productivity and improved

quality. Professionals should be trusted in advance and given room to exercise their discipline at a state of the art level.”

How is this relevant for TNO? First, we would like to propose that TNO is a hybrid organization regarding culture: on the one hand, TNO consists of professionals, who would perform best in a ‘high trust’ culture; on the other hand, TNO is increasingly moving towards a ‘low trust’ culture, with formalities, legal compliances, governance structures such as risks board, and a management style that tends to needs to show that it is ‘in control’. The latter is the result, in very general terms, from the external pressure, from society, in response to, e.g., the financial crisis. Many organizations are increasingly confronted with critical questions and need to demonstrate that they are ‘in control’, that they can manage risks.

As was already discussed in JERRI D1.1, up to several years ago, TNO was a high-trust organisation, and its research findings were trusted by its customers and by the general public. Nowadays, however, in the era of ‘alternative facts’ and ‘fake news’, we find that this trust needs to be earned by fact-based science and by demonstrating accountability, e.g., regarding the selection of methods, the data used, how analyses were made and conclusions were drawn.

This hybrid character plays out in the institutionalisation of RRI, and more specifically, along the axis of low-trust versus high-trust, where low-trust produces barriers and high-trust produces enablers. Here are several speculations, that will, of course, need to be tested—see Table 3:

- People’s motivations can be both a barrier or an enabler: in a low-trust context, people will feel resistance to change, including a resistance to ‘do RRI’; conversely, in a high-trust context, they will express their motivations to change things for the better, and to ‘do RRI’.
- The issue of ‘having time/budget’, or not, can play out similarly: in a low-trust context, people will behave rigidly and say that they cannot make time for RRI; in a high-trust context, however, they will feel more free to spend time/budget on RRI.
- Regarding awareness and urgency: in a low-trust context, people will be less sensitive to new topics, like RRI (‘no thanks, I have already enough work’); whereas in a high-trust context, people will be more sensitive to see a new topic like RRI as relevant and urgent.
- Leadership is tightly related to trust; leadership support is critical for changing people’s attitudes and organizational culture: leaders can affect change as role models or change agents, and they can empower others to follow their lead (‘servant leadership’)
- Finally, there is the issue of clarity: we did already see that clarity, e.g., about roles, tasks and responsibilities, can be a enabler, and can remove barriers. Furthermore, we speculate that a high-trust context will yield ‘real’ clarity (where people speak up their minds and feel responsible), whereas a low-trust context will yield ‘artificial’ clarity (with lots of complex processes and forms that create opacity, rather than clarity).



Table 3: How low-trust and high-trust produce barriers and enablers, respectively

	<b>A low-trust context is likely to produce barriers for the institutionalisation of RRI</b>	<b>A high-trust context is likely to produce enablers for the institutionalisation of RRI</b>
People’s motivation	Resistance to change; no room for RRI	Motivation to change things for the better to ‘do RRI’
Perception of time and availability of budgets	People’s agendas are full; they cannot work on RRI	People feel free to work on RRI
Awareness and urgency	Lack of awareness	Sense of urgency
Leadership	Command structure; targets are rewarded; they have a return in the immediate future	Motivation and inspiration from leadership are drivers to excel as an organisation
Clarity, e.g., about roles, tasks, responsibilities	‘Real’ clarity, where people feel responsible	‘Artificial’ clarity, with lots of complex processes

### 3.5 Resistance and change agents

Another (and similar) point can be made about resistance. Above, we discussed ‘resistance to change’ as a barrier, e.g., in the discussions about Ethics and Societal Engagement (but also, implicitly in the other dimensions). We would like to provide some nuance to that discussion now. Ford et al. (2008: p. 362), critiqued the “one-sided story that favors change agents by proposing that resistance is an irrational and dysfunctional reaction located “over there” in change recipients”; instead, they “tell the rest of the story by proposing that change agents contribute to the occurrence of resistance through their own actions and inactions and that resistance can be a resource for change.”

We would like to continue on their last point, that resistance can be a resource for change. People’s resistance simply means that they value something; they are currently working on A, and they don’t want to follow your advice to work on B. Viewing their ‘resistance’ as a ‘resource for change’ would mean, e.g., that you reframe and rephrase B in terms that will appeal to them, i.e. in terms of A.

Here is a practical example, from our work on the Toolkit. Its potential users are business developers and project managers; they are typically busy with talking to customers and managing projects. They don’t have time to learn about a new Toolkit. Apparently, they resist the Toolkit. If you were to ‘frame’ the Toolkit in terms like ‘enabling you to have better conversations with customers’ or ‘enabling you to identify and manage risks in your project’, then their resistance will dissolve.

In this sense the importance of change agents is essentially working on people and enable them/trust them (from a high trust /servant leadership perspective) to make changes themselves and use enabling /assistive methods/tools or KPI's to allow them to make the change count and institutionalize them.

## 4 Conclusions and recommendations

The purpose of this report has been to identify and discuss the barriers and enablers that people in TNO encounter in their attempts to (further) institutionalize RRI within TNO. We discussed the activities for the different dimensions of RRI: Ethics; Gender Equality; Societal Engagement; Science Education; and Open Access.

We can draw the following conclusions:

The JERRI project is example of external agenda-setting to critically rethink and reflect on RRI. It captures the external drivers and de facto legitimizes the institutionalisation towards a chosen narrative. The process is flexible, in allowing different starting points for each dimension and thereby giving enough comfort (trust, empowerment and awareness) for each dimension and it's change agents.

By doing so:

- Different dimensions require different values, because the maturity is different
- Having SMART goals, helps in giving clarity and instruction and empowers change agents to act. Leadership support for these goals is crucial otherwise activities will be isolated and one-off attempts
- Having a budget is critical, otherwise activities can not be started or completed.
- Different dimensions require different governance tools and strategies
- Trust seems to play a critical role (to be tested) and having change agents in the team is key for further institutionalising

Moreover, we can articulate the following recommendations:

- Combine 'hard' and 'soft' measures:
  - On the 'hard' side: set SMART goals; and obtain budgets
  - On the 'soft' side: foster trust and servant leadership
- And combine specific and general measures:
  - Each dimension requires specific measures, e.g.,
  - Promote RRI in more general terms, e.g., through central approach, e.g., CSR. A practical example being the new CSR strategy 2018-2021 embracing the concept of RRI and a move towards a narrative.

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