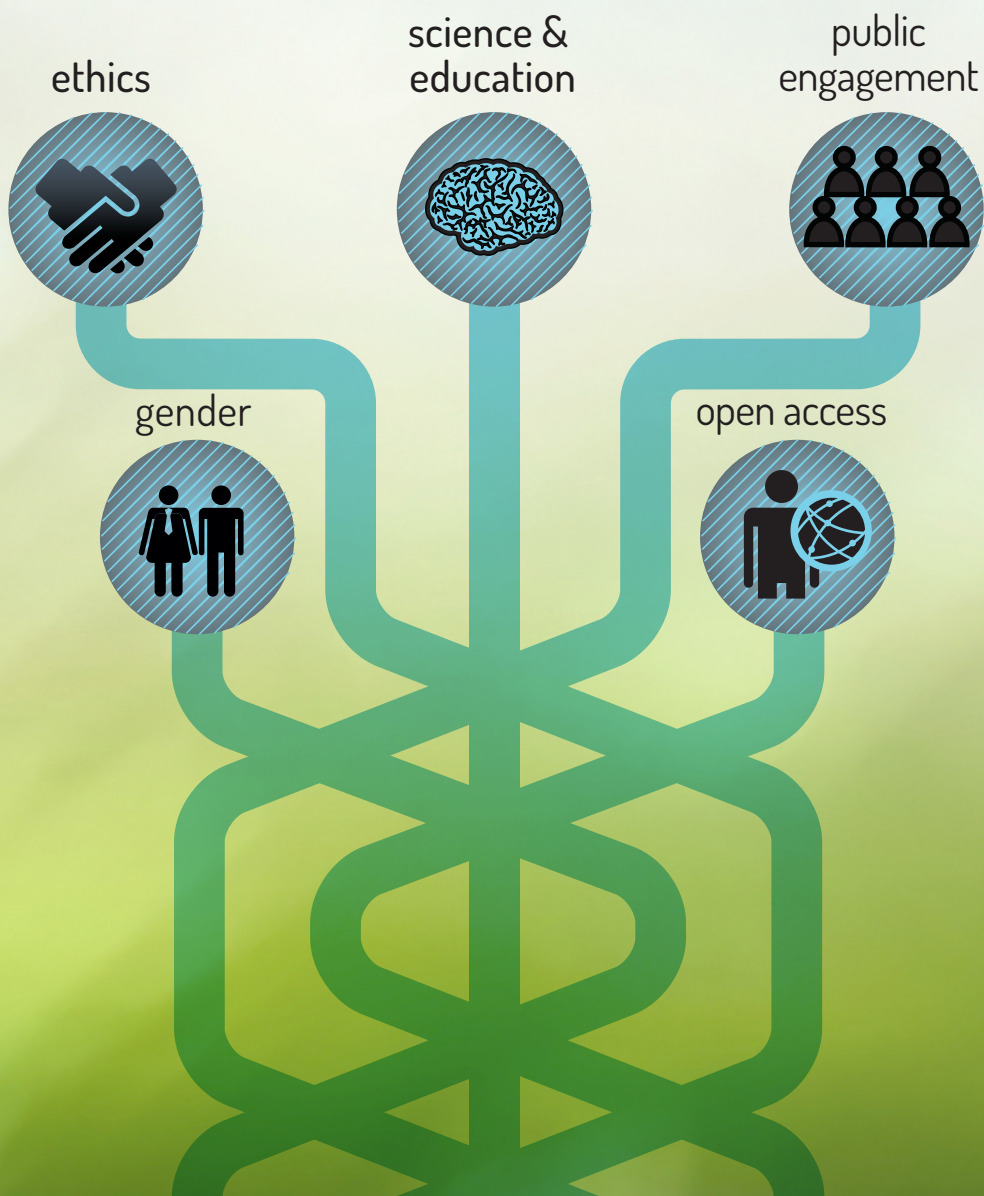


Transformative RRI action plan for TNO

DELIVERABLE D5.2



JERRI – Joining Effort for Responsible research and Innovation

Deliverable D5.2

Transformative RRI action plan for TNO

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Glossary

- BIOS - Business Information & Operation Services
- CRM - Customer Relation Management
- EARTO - European Association of Research & Technology Organisations
- ERP - Early Research Programmes
- HR - Human Resources
- H2020 - Horizon 2020
- IP - Intellectual Property
- JERRI - Joining Efforts on Responsible Research and Innovation
- KPI - Key Performance Indicator
- LD - Leadership Development (part of Human Resources)
- OA - Open Access
- OS - Open Science
- POS - Platform Open Science
- TNO - The Netherlands Organisation of Applied Scientific Research
- RRI - Responsible Research and Innovation
- RvB - Executive Board of Directors (Raad van Bestuur; in Dutch)
- SAR - Strategic Advisory Councils
- SMART - Specific, Measurable, Achievable, Relevant, Timebound
- STEM - Science, Technology, Engineering, Mathematics

Purpose

This document (D5.2) builds on several earlier documents: D3.1, which discussed the *process* of goal-setting within TNO; D3.2, which documented *specific goals* for Responsible Research and Innovation (RRI) at TNO; and D5.1, which discussed various *organizational barriers and enablers* regarding the institutionalization of RRI at Fraunhofer and TNO.

The goal of the current document is to present the specific and concrete actions towards institutionalization of RRI within TNO, including their time schedules and responsibilities (in the form of a roadmap), as well as the general theoretical concept underlying these actions, based on the theoretical state of art (D1.2). In that sense, it is a synthesis of earlier documents (D1.1.; D1.2; D3.1; D3.2; D5.1 and D10.2).

More information on the JERRI project, the RRI dimensions and their current implementation within Fraunhofer and TNO can be found in *D1.1 Synthesis of existing RRI practices* (November 2016), and more information on the institutionalization of RRI can be found in *D1.2 Deepening 'Deep Institutionalisation'* (November 2016). Other publications refer to the process of goal setting (D3.1), the actual goals (D3.2) and the lessons learned from goal setting (D10.2).

Executive Summary

In this deliverable we show how goals are transformed into action plans and how actions plans are helping with the ambition to institutionalize change within the TNO organisation. Moreover, the TNO organisation itself has changed per January 2018, which is explained and presents consequences for the JERRI-project.

The starting point for the transformative action plans is an update of the goals (per RRI dimension) that have been set in deliverable 3.2. These (updated) goals are embedded in the form of a roadmap, helping to show how current activities, meant for achieving the specific goals, are part of a wider strategy of institutional change. Per RRI dimension we established essential attributes for institutionalization. These attributes are considered part of the ‘legacy’ of JERRI and essential for successful transformation. The guiding questions for the transformation were:

- After the JERRI project is concluded, how can we make sure that ad-hoc activities will lead to structural changes in our institutional logics, so they become part of the ‘new normal’?
- Who will be the ultimate sponsor and or beneficiary of our JERRI activities?

As a result each RRI dimension is discussed and based on the goals and long term vision a break-down of specific activities that are needed to realize those goals is presented including the required collaboration needed for these activities, with a focus on internal actors and change agents — also taking into account the barriers and enablers that were found (JERRI D5.1), and the new organizational structure of TNO as per 2018.

This results in a planning of activities for the remainder of the JERRI project including 2019 and plans for (further) implementation and institutionalisation, in order to increase chance that the activities will continue after the project.

Finally we discuss the dependency on (internal) stakeholders as agents of change and ultimately the Services Organisation as essential partner for successful institutionalisation.

1 Introduction

Overall, the ambition of TNO is to further develop and institutionalize Responsible Research and Innovation (RRI). TNO's participation in the JERRI project, a collaboration with Fraunhofer and several other knowledge institutes, offers an opportunity to do that.

TNO has the mission to “connect people and knowledge to create innovations that boost the sustainable competitive strength of industry and well-being of society” (<https://www.tno.nl/en/about-tno/mission-and-strategy/>). Indeed, RRI is part of TNO's mission. Looking at the different possible ‘narratives’ regarding RRI (JERRI D1.2), TNO's current strategy and culture resembles Narrative B: Technological Progress, which is characterized by trust in technological progress, and which is legitimized by the Triple Helix of business, knowledge, and government. In addition, TNO has the ambition to move its strategy and culture towards Narrative F: Research and Innovation With/for Society, e.g., in its ambitions to develop solutions for societal problems.

The process of goal-setting for RRI at TNO is partly based on external orientations (e.g., on ‘best practices’ of other organizations); and partly on internal orientations, which happen both bottom-up, e.g., when employees voice their ambitions, and top-down, e.g., when directors articulate their ambitions. Furthermore, goal setting happens partly informally or ad-hoc, e.g., when reacting to external events, and partly formally and systematically, e.g., when writing action plans for specific topics.

The context of the TNO organisation has changed as we have entered a new strategic period with accompanying changes in the organisational structure as per January 2018. The new strategic period has a timeline of four years (2018-2021), creating an intermediary horizon that can be both ambitious in terms of goals, but is still within the span of control of the current organisation and board of directors.

The organisational structure of TNO is now as displayed in Figure 1. TNO went from a Matrix organisation to a Unit-type organisation where individual units carry a market responsibility as well as a science and operational responsibility. Supporting units are part of the line-management (services organisation). Individual Units have expertise groups. A unit varies in size between 40 and 400 staff.

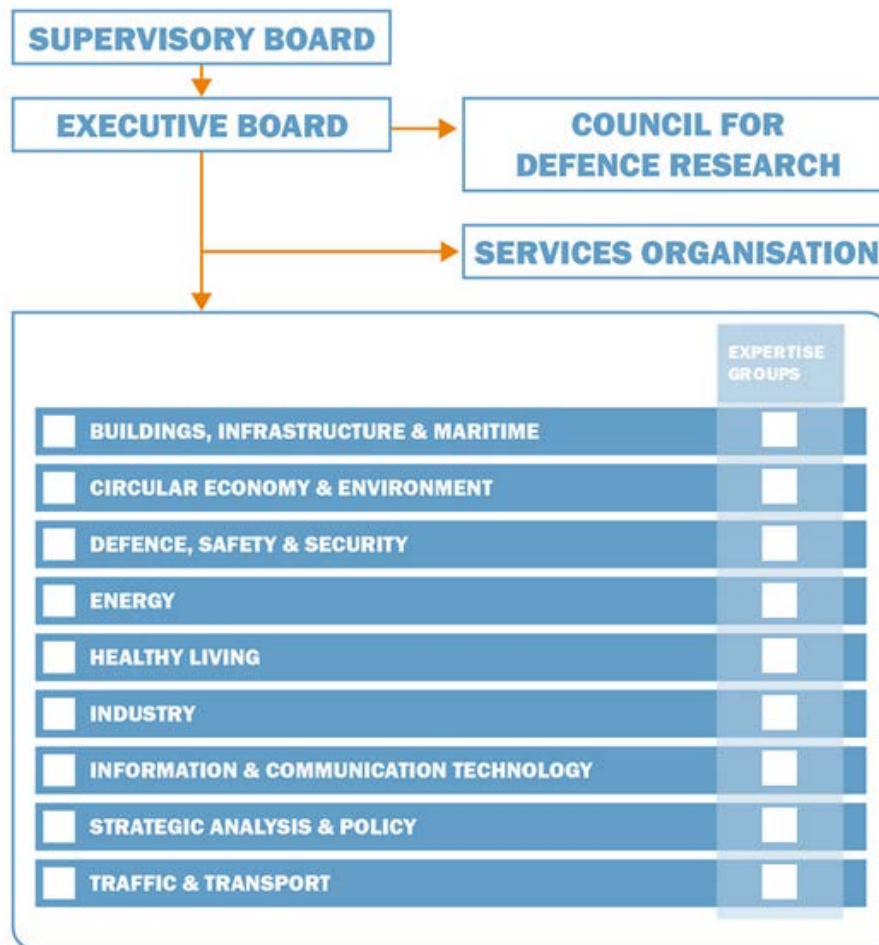


Figure 1: Organisational Structure of TNO per 1 January 2018 (Source: <https://www.tno.nl/en/about-tno/organisation/>)

As discussed earlier, e.g., in JERRI D1.1 and JERRI D3.1, TNO is relatively centrally organized. As a result, the relevant people, e.g., for a specific RRI dimension, like Ethics, can be brought together relatively easily, and the plans of TNO are short-term oriented, because they are articulated by relevant stakeholders and change agents, within a relatively small and centralized organization.

As discussed in D5.1, the role of change agents is considered crucial for successful institutionalization. The advantage of bringing change agents together in the form of a project, such as JERRI and allow them to exchange experiences and work together on all 5 RRI dimensions integrally (all across TNO) is considered an advantage of our approach, as change agents have a pivotal role towards the wider organisation. Change agents can be found in various persons in the organisation and have a role or responsi-

bility in the organisation, or are in key positions where they can influence or affect decision making processes about institutional change. The iterative approach followed in the JERRI project allows that we make adjustments if needed/based on feedback from change agents, who are to a large extent involved in the change process itself. These change agents help us to find other/new change agents.

In developing the roadmap we take the current (new) TNO Strategic Plan and a longer term vision in order to show a logical embedding of JERRI actions. Emphasis will be given to proper institutionalization of the ambitions in the roadmap, by involving the wider organisation, thereby reducing the relative vulnerability of individual actions or change agents, by sharing and embedding the ambitions of RRI.

1.1 Overview of action plans

A list of the specific goals and actions for each of the five dimensions of RRI (taken from D3.2) is presented in Table 1; it also includes collaborations that are needed with change agents within TNO, and options for creating synergy between the different dimensions. This is the starting point for this deliverable as we use these actions to work towards the institutionalisation of RRI in TNO.

Table 1: Specific goals and actions for each RRI dimensions, including comments on collaborations needed and options for creating synergy between dimension (based on D3.2)

Specific goals and activities for the different dimensions of RRI	Collaboration with change agents that is needed for this (internal stakeholders)	Synergy between RRI dimensions
Ethics		
Ethical Awareness Training/Game	Human Resources (HR) HR, Leadership Development (LD) manager Trainees manager	Societal Engagement
Societal and Ethical Impact Toolkit	Marketing and Communications Units Project Management Guild	Societal Engagement
Scientific Integrity E-learning Module	Integrity Commission Corporate Science Office	-
Gender Equality		
Female Leadership Training	W@T (Women at TNO), Leadership Development (LD)	
Database for Female Talent	HR, LD, Unit directors/research managers	

Implicit Bias Training (25 HR managers)	HR, LD	Ethics
Societal Engagement		
Involve societal stakeholders in Strategy Advisory Councils	Units CSR Committee	
Societal and Ethical Impact Toolkit	Marketing and Communications Units Project Management Guild	Ethics
Share Best Practices in User Involvement	Marketing and Communications Units	
Science Education		
To show science;	CSR steering Committee Units Marketing & Communication	Societal Engagement
To champion the value of science	Integrity Officer, Science Director Marketing & Communications	Ethics
To invite Society	CSR steering committee external (STEM professionals, women, interest groups)	Societal Engagement
Open Access*		
Set up platform and action plan.	Intellectual Property and Contracting (IP&C), Research Information Support (RIS), Business and Contract Support (BCS), Scientist	
Decision Tree Publishing	Research & Information Support	

* please note that the activities for Open Access are new (not been mentioned in D3.2).

1.2 Deviations from Goal Setting

As time has progressed since the goals setting in D3.2 between summer 2017 and spring 2018; some goals have been slightly changed and adopted. On the other hand, immediate activities have been started in autumn 2017 to achieve the set targets for JERRI. Most notably the opportunity of the new structure of the organisation, meant that immediate actions were taken to positively influence this.

Most notable deviations have taken place in the RRI dimensions of Open Access and Gender Equality.

Open Access: since the installation of the Open Access working group a more detailed work programme has been set up in order to advance this topic in as systemic way for the organisations as a whole. This meant wider embedding of internal stakeholders and

discussing next steps to advance the topic towards Open Science and the relation with the business model of TNO, upcoming legislation and the positioning of TNO. This has led to a detailed work programme, including deliverables and time planning. As such it is not a deviation as such, but a more detailed workplan.

Gender Equality: as the JERRI activities are organised to an extent through the Diversity programme of TNO, more and more activities have been added. This has not changed initial goals, but broadened up the range of activities that will be executed and reported on in JERRI. Minor deviations are reported for Science Education.

No other significant deviations in relation to earlier goals can be noticed. However tailoring of goals and activities to external agenda's and initiatives has taken place. Most notably the external agenda on Scientific Integrity plays into the activities organised in Science Education and Ethics. This has meant that more attention has been given to this topic (more attention has been drawn to these planned activities).

More details on the above changes can be found in chapter 2.

1.3 Methodology

In order to embed the Action Plans from D3.2 into a roadmap, and take into account the theoretical and practical lessons learned for successful institutionalization, the following methodology was applied to prepare this deliverable.

As deliverable 3.2 (action plans) had recently been approved at the level of sponsor and several internal committees, individual plans for dimensions were taken as the basis for further institutionalization. As discussed in D10.2 the time frame for actions was chosen to be relatively short, focusing on short term goals (for specific reasons).

Dimension leaders, or their assistants, all part of the JERRI project team, took charge of organizing either workshops or types of consultations. Through wider participation of stakeholders (both internally and externally), and meetings with change agents, the focus for discussions was put on the longer term; the embedding of the RRI Dimension in TNO. Not only were internal stakeholders more prepared (as the JERRI project is gaining attention and activities are prepared and executed), also the organisational preparedness (for working in the new organisational structure in the new strategy period) was now better known and understood (this structure and way of working was challenging at the time of deliverable 3.2). As an example of this, the place and composition of the different steering committees is known, the plans for these committees (for the strategy period) were developed and as a result annual plans were agreed on.

Another reasons for this longer term planning is the objective of the JERRI project itself, focusing on institutionalisation, where trying to shift the dependency from individual change agents towards a situation where institutional logics take over and the organisational culture, capabilities and capacities are geared toward awareness and acceptance of RRI (as a transformation into a new narrative).

For the development of roadmaps this gives possibilities to look at three moments in time

- End of JERRI project – (short term) - May 2019
- End of current strategy period – (mid-term) – December 2021
- Vision – (long term) – Beyond 2025

The framework that is used to capture each JERRI-dimension can be described as in the following figure:

Societal Engagement

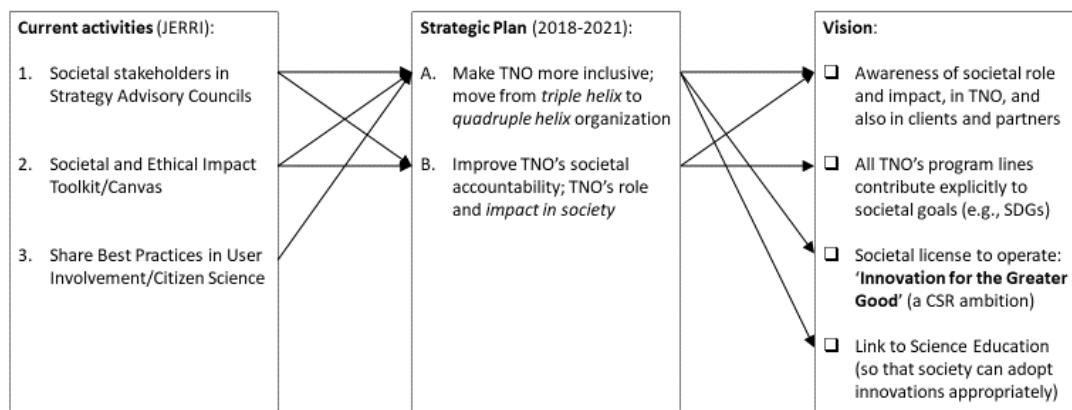


Fig 2: Roadmap for RRI dimension Societal Engagement (example)

Furthermore RRI Dimension leaders elaborated goals and activities in more detail, with a focus on institutionalization. When possible, learnings from D5.1 (analysis of barriers and enablers), were incorporated in order to become more effective in the execution of JERRI activities.

We therefore also enlarged our planned activities to not only incorporate SMART¹ targets, but also to include attributes of institutionalization. These attributes were included in our assessment of D5.2 and are considered part of the 'legacy' of JERRI and essential for successful transformation. The guiding questions for the transformation were:

¹ SMART: Specific, Measurable, Achievable, Relevant and Timebound



- After the JERRI project is concluded, how can we make sure as a project team that ad-hoc activities will lead to structural changes in our institutional logic?
- How can we align JERRI activities with existing processes and activities, so they become part of the 'new normal'?
- Who will be the sponsor and or beneficiary of our JERRI activities.?

In chapter 2 we will further explore the transformative actions plans per dimension.

2 Action plans

In the sections below, the specific goals and activities for the different dimensions of RRI are discussed: Ethics; Gender Equality; Societal Engagement; Science Education; and Open Access. Each section starts with a discussion of issues that are relevant for that specific dimension, drawing from JERRI D10.2 *Lessons learned for goal development* and JERRI D5.1 *Barriers and enablers for the institutionalization of RRI at TNO*. After that, the specific goals are discussed, according to this structure:

- First, the overall goal or ambition (in one sentence);
- Roadmap leading to this overall ambition;
- SMART goal(s) (from JERRI D3.2; and taking into account the lessons learnt from goal setting (JERRI D10.2));
- Activities: A break-down of specific activities that are needed to realize those goals;
- Collaboration; needed for these activities, with a focus on internal actors and change agents — also taking into account the barriers and enablers that were found (JERRI D5.1), and the new organizational structure of TNO as per 2018;
- Planning of activities, for the remainder of the JERRI project, until 2019 Q2;
- Institutionalization: the plans for (further) implementation and institutionalization, in order to increase chances that the activities will continue after the JERRI project (therefore the planning extends to 2019 Q4, six months after the end of JERRI).

2.1 Ethics (Integrity)

The overall vision for Ethics at TNO is that all employees (including management) are aware of the ethical implications of their work, and of their own personal and professional ethics. TNO expects from its employees to align with TNO's guidelines for Scientific Integrity, Business Integrity, Societal Engagement and Workplace Integrity. TNO wants to employ persons of high integrity (see also D1.1).

TNO does not understand ethics as judging about right or wrong. Instead, TNO sees ethics as a process: 1) identifying (potential) ethical issues; 2) dialogues with relevant stakeholders; 3) well considered decisions based upon our core values and long term value creation and 4) providing satisfactory accounts of specific choices and actions. Since ethics is a process, TNO wants to keep learning and improving itself continually.

In line with this, TNO wants to have systems and processes in place to quickly and easily prove its integrity and compliance to the TNO Code of Conduct and to relevant other codes and laws & regulations. If necessary, in situations where employees have behaved unethically, TNO will take disciplinary measures. Furthermore, TNO wants to be a leader in ethics and support a strong positive ethical organization culture. TNO is

aware of its position and wants to positively influence its surroundings, society and (the ethics of) suppliers, customers and partner organizations.

Ideally, TNO is perceived as pioneering innovation and doing so responsibly and ethically. TNO's tagline is and should be: 'Responsible Innovation'.

For the next couple of years, TNO will work on its ethics based upon a Strategic Plan for Integrity (2019-2022), which will cover the following topics (to be approved in the Integrity Committee in April 2018)—between brackets are the specific JERRI-related activities that will contribute to these topics:

- Risk management in relation to integrity, e.g., regarding scientific integrity or business integrity (Toolkit/Canvas);
- Awareness of ethical and societal issues and potential (first, second or third order) effects of projects (Training/Game; Toolkit/Canvas; E-learning);
- Compliance, i.e. following the TNO Code of Conduct (Toolkit/Canvas; E-learning);
- Ethical leadership and strong ethical culture (Training/Game);
- Long-term value creation (Toolkit/Canvas).

In order to further develop, implement and institutionalize Ethics (or Integrity, as it is referred to within TNO), the following actions are planned (JERRI D3.2: pp. 17-22):

1. Ethical Awareness Training/Game;
2. Societal and Ethical Impact Toolkit/Canvas;
3. Scientific Integrity E-learning Module.

These action plans were discussed and further developed in several meetings:

- Discussion with Leadership Development (LD) advisor about the Ethical Awareness Training/Game (as internal clients) (16 January 2018);
- Discussion with co-workers from Training and Performance Innovations (as internal developers of the training/game) (18 January 2018);
- Meeting of the Integrity Commission about the Year Plan, including these actions (22 January 2018).

There are several small modifications of the plans, when compared to D3.2:

- In our analysis of barriers and enablers of RRI (D5.1) we found that the institutionalization of Ethics requires both 'hard' measures, such as the installation of an Integrity Advisory Board and Integrity Officer, with formal tasks and responsibilities, and 'soft' measures, such as the internalization of values like anticipation, reflection, deliberation, responsibility, by employees. Healthy doses of both are needed. Too many 'hard' regulations (e.g., numerous checklists) could pose a barrier for the institutionalization of Ethics. And measures that are too 'soft' (e.g., 'touchy feely' workshops or 'abstract' discussions) would also pose a barrier. As a result, we currently aim for a balance of 'hard' and 'soft' measures in our plans.
- The installation of a Governance, Risk and Compliance Advisory Board and the installation of the renewed Integrity Advisory Board (former Integrity commission) per February 2018 will also give new impulses to the soft and hard controls efforts on integrity and compliance within TNO.

- In addition, we closely monitored the ongoing organizational changes within TNO, and found that the institutionalization of Ethics (and other RRI dimensions) will require a closer collaboration with Human Resources (HR), e.g., for Ethics, we will seek collaboration with HR for the embedding of the Training/Game in the Leadership Development (LD) program of HR. To embed Ethics (and compliance aspects) better in our systems, cooperation is sought with BIOS (the business owner of the management system).

Figure to illustrate the relationships between current activities (in the JERRI project; 2016-2019), the Strategic Plan for Integrity (2019-2021), and the overall vision:



Figure 3: Relationships between: current activities for Ethics/Integrity in JERRI, Strategic Plan for Integrity, and longer-term vision for Ethics/Integrity

These actions are presented in more detail below:

2.1.1 Improve ethical awareness and moral capabilities

Goal: To enhance ethical awareness and moral capabilities of people at TNO, especially of people in leadership roles.

SMART goals:

- All managers (approx. 250) participate in a (newly to be developed) Training/Game and evaluate it with a 4 (or more) on a 5-point scale;
- All trainees (approx. 25) participate in a (newly to be developed) Training/Game and evaluate it with a 4 (or more) on a 5-point scale.

Activities:

- Develop a Training/Game (on the basis of the 'Mayor Game', by filling it with newly to be developed content: storyline, dilemmas, perspectives, values), and first try-out a prototype with a group of 'friendly' trainees and managers;
- Offer the Training/Game to trainees (approx. 25 people; young talent; bottom-up);
- Offer the Training/Game to the 1st, 2nd and 3rd echelons of TNO (approx. 250 people; top-down);



- This combination of top-down and bottom-up is likely to have positive impact in TNO as a whole.

Collaboration needed with:

- Human Resources HR Leadership Development manager;
- Trainees manager.

Planning:

- Develop Training/Game in 2018 Q1-Q2 (in JERRI D3.2, this was planned for 2017 Q3-Q4; but this was intentionally delayed in order to better align with the new organizational structure of TNO, as per 2018);
- Offer Training/Game to trainees in 2018 Q3;
- Offer Training/Game to managers in 2018 Q4;
- Report in 2019 Q1.

	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4
Improve ethical awareness	Dev	Dev	App	App	Rep			

Dev = develop and try-out

App = apply or execute

Rep = document or report

Institutionalization:

- After the JERRI project, the Training/Game will become part of the HR repertoire.

We took into account the barriers and enablers (D5.1) in that we seek more collaboration with HR, because they are crucial for the institutionalization.

2.1.2 An ‘Ethical and Societal Impact Toolkit’

TNO wants to improve its ability to assess ethical and societal issues in its research and innovation projects (both intended and unintended impact), as an integral part of business development and project management. The tool will be used in different stages: 1) to articulate the project’s intended impact (before); 2) to steer the project towards positive impact on society; and 3) to evaluate its actual impact (afterwards).²

SMART goals:

- Develop a Toolkit tool to support business developers and project managers of ‘sensitive projects’ to discuss and ‘solve’ societal and ethical issues (framed as risk management), re-using currently available tools.

² Please note that this action plan is a combination of Ethics and Societal Engagement (notably a combination of the ‘Ethical and Societal Issues’ tool of Ethics, and the ‘Societal Impact Tool’ of Societal Engagement).



- Try-out this Toolkit in four projects, with ‘friendly customers’ (first users) from these projects, where they evaluate the Toolkit with a 4 (or more) on a 5-point scale.
- Present this Toolkit to a wider audience: 50 business developers (of total 130; via ‘Selling Innovation SAMEN’ meetings); and 50 (senior) project managers (of total 200; via Project Managers Guild meetings)

Activities:

- Develop the Toolkit (re-using parts of the Checklist complexity project, Customer Acceptance Policy, the Societal Impact Assessment Tool (TNO trainees in 2014) and results of the SATORI project (http://satoriproject.eu/media/Philip-Brey_EIA.pdf);
- Try-out the Toolkit in four projects;
- Present the Toolkit to business developers and project managers.

Collaboration:

- Marketing and Communications;
- Units, e.g., ICT (responsible data innovation), Innovation4Development (sustainable development), Industry (anti-corruption) and Energy (societal impact);
- Project Management Guild (group in TNO of senior project managers).

Planning:

- Develop the Toolkit in 2018 Q1;
- Try-out the Toolkit in 2018 Q2 and Q3;
- Present the Toolkit in 2018 Q4 and prepare for wider application within TNO;
- Report in 2019 Q1.

	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4
An ‘Ethical and Societal Impact Toolkit’	Dev	Dev	Dev	App	Rep			

Dev = develop and try-out

App = apply or execute

Rep = document or report

Institutionalization:

- After the JERRI project, the Toolkit will be available for the Units’ Business Development repertoire and for the Project Management Guild repertoire.

We took into account the barriers and enablers (D5.1) in that we aim to introduce this Toolkit via both ‘hard’ and ‘soft’ measures; we aim to include the Toolkit in the current (‘hard’, formal) working processes, and we seek to create broader (‘soft’, informal) support for taking into account societal and ethical issues, e.g., from top management, and via four ‘friendly customers’ (first users within TNO).

2.1.3 Scientific Integrity e-learning module

Goal: To improve awareness within TNO of the national Scientific Code; esp. amongst principal and senior scientists.

SMART goal:

- 20 principal scientists (of a total of 27) plus 40 senior scientists (of a total of 400 senior scientists) participate in the e-learning module, and evaluate its usefulness with a 4 (or more) on a 5-point scale. Science Directors and Research Managers can participate on a voluntarily basis.

Activities:

- Develop a compact e-learning module (e.g., containing 2-3 video clips of 2-3 minutes, with 2-3 quiz questions) to explain this new Scientific Code (support from Training and Performance Innovations, a research group of TNO);
- Offer this e-learning module to principal (and senior) scientists, science directors and research managers.

Collaboration:

- Principal and senior scientists (as participants);
- Integrity Commission, lead for Scientific Integrity;
- Corporate Science Director.

Planning:

- Develop the e-learning module in 2018 Q3 (in JERRI D3.2, this was planned for 2017 Q4; but it was intentionally delayed, in order to synchronize with the Dutch national initiative, in which TNO participates, to update the Code of Conduct for Scientific Integrity; they plan to have the new Code available in May/September 2018; it is therefore more feasible to start development in 2018 Q3, using this new Code).
- Offer the e-learning module in 2018 Q4 and 2019 Q1.

	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4
Scientific integrity e-learning module			Dev	App	App			

Dev = develop and try-out

App = apply or execute

Rep = document or report

Institutionalization:

- After the JERRI project, the e-learning module will be part of the HR repertoire.

We took into account the barriers and enablers (D5.1) in that we use both 'hard' (formal) measures, e.g., requiring senior scientists to follow the e-learning module, and 'soft' (informal) measures, e.g., raising awareness within TNO for scientific integrity.

Moreover, TNO contributed several comments to the development of the new (national) Code of Conduct, via the online public consultation website:

- Regarding Responsibility (section 3.5): It would be good to make the role of research and innovation in society more explicit, e.g., by referring to Responsible Research and Innovation (RRI) and Societal Engagement ('engage society more broadly in its research and innovation activities');
- Regarding Public and Professional Communication (section 4.6): It would be good to mention risks that results of research and innovation can be used in ways that the researchers and innovators did not intend and cannot endorse, e.g., for 'dual use', where a technology for a civil application is used for a military application;
- Regarding Ethical norms and procedure (section 5.6): It would be good to recommend an 'ethical impact assessment threshold analysis', e.g., based on recent results of the Satori project (<http://satoriproject.eu/framework/section-5-ethical-impact-assessment/>), at the start of a project, in order to clarify whether a thorough ethical assessment is needed (or not).

This can be understood as contributing/taking responsibility to the development of a formal policy instrument outside TNO, to which TNO will choose to comply, as per 2018.

2.2 Gender Equality (Diversity)

TNO has a (gender) diversity vision embraced in the TNO diversity policy and strategic plan. TNO strives to be an organisation where all employees have equal opportunities, are able to develop as much as possible and, are fully allowed themselves. These equal opportunities reflect itself in the organisation numbers (total percentage of female employees and percentage of women in the senior positions). TNO also strives to create an inclusive learning and working environment in which the differences that exist are used to stimulate maximum creativity, innovation and talent development.

As described in D1.1, the long term goal for Gender Equality at TNO is to realize 30% women in TNO's senior management (TNO, 2016). The Strategic Plan has a KPI of 40% of TNO employees in 2021 being female (TNO, 2017).

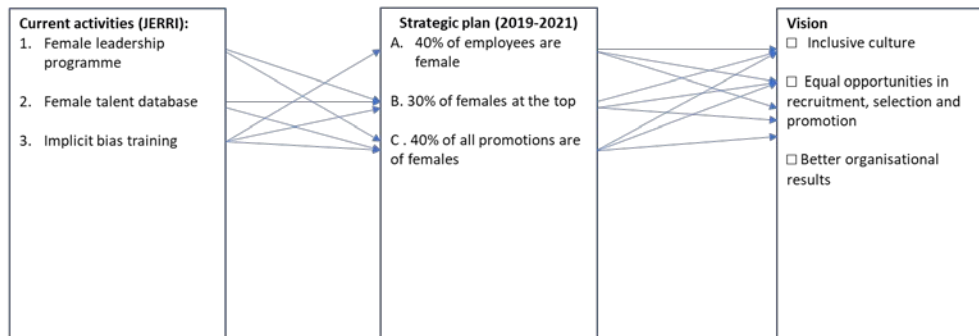


Figure 2: Relationships between current activities for (Gender) diversity in JERRI, Strategic Plan, and long-term vision for (Gender) diversity.

In order to further develop, implement and institutionalize Gender Equality (or Diversity, as it is referred to within TNO), the following actions were planned (JERRI D3.2: pp. 14-17), which have also been confirmed as necessary for improving gender equality by relevant stakeholders within TNO (see JERRI D 5.1 pp 11-15).

1. Increase the visibility of female talent, and female leadership by means of
 - a. Female leadership programme;
 - b. Development of (female) talent database.
2. Create awareness on implicit bias with respect to gender
 - a. Training for Top 25 managers;
 - b. Contribute a case of gender to serious game.

It is good to mention that in JERRI deliverable D3.2 one of the global goals was supporting the gender dimension in research/research content. Given that this goal has not been identified as a priority for TNO, it has not been developed into a SMART goal and is not contributed to by current activities.

In the previous steps of the JERRI project (barriers and enablers, JERRI D 5.1), training on implicit bias was expanded to focus on HR professionals as well, instead of only on senior managers within TNO. Several activities additional to what has been described in D3.2 have been identified as beneficial to supporting gender equality:

3. Need for developing gender neutral recruitment guidelines (as one of the ways to bring in female talent)-see 2.2.3;
4. Engage HR professionals as discussion partners (in order to ensure that the change is institutionalised)-see collaboration with stakeholders in 2.2.1 and 2.2.2;
5. Monitoring of (gender) diversity figures in order to know whether activities within TNO have a desired effect- see 2.2.3;

6. Changing the way in which performance and evaluation talks are done (in order to increase the visibility of female talent) see 2.2.1.

Contributing a gender case to a serious game (see Ethics part 2.1.1) has been adjusted after internal discussion with dimension leaders and developers of the ethics game so that gender dimension does not have a case of its own but rather supplies elements of gender dilemmas where possible, to the existing ethics game.

These activities were discussed and further developed in several meetings:

- Meeting with two members (male and female) of HR (analytics) team concerning following (gender) diversity figures (30th November 2017);
- Meeting with a male HR (recruitment) team member concerning (female) talent database (1st December 2017);
- Meeting with a male Unit director concerning development of (female) talent database (8th January, 2018);
- Meeting with a female Unit director concerning development of (female) talent database (9th January 2015);
- Meeting a female LD team member concerning performance and evaluation talks, and talent management within TNO (17th January 2018);
- Meeting of the Diversity steering committee to discuss overall action plan and possible adjustments needed based on deliverable 5.1 (8 members, 18th January 2018).

One activity that TNO is implementing as part of the measures of/for Increasing visibility of female talent goal, but that has so far not been mentioned in the JERRI project is, that TNO takes part in the Cross mentoring program. This is organized by an external organisation. Female employees are coupled as mentees to mentors from other companies that are taking part in the program, in order to support mentees' professional development and carrier steps. The program is focused on bringing together mentors and mentees from diverse companies in contact with each other, so that the mentees can learn from experienced mentors in another sector. From TNO, 6 mentors and 6 mentees are taking part in the program. This activity will further be explained under 2.2.1.

The action plans are presented in more detail in the sections below:

2.2.1 Increase the visibility of (female) talent and develop female leadership

SMART goals:

- Organising 2 series of Female Leadership Trainings, consequently training 40+ women, that evaluated the usefulness of the training with a 4 (or more) on a 5-point scale;
- Using and expanding current HR/Talent databases and applying this in practice; report on use through review of database by LD-committee;

- Changing the ways in which performance and evaluation talks are done, especially in view of talent management;
- Inclusion activities: Organising a lecture on inclusion and making it available TNO wide and organising a workshop on inclusion for research managers and programme managers of Defense Unit.
- Taking part in Cross mentoring program.

Activities:

- Female Leadership Training (in progress). This training program is tailored to female employees and covers topics such as negotiation skills, visibility, implicit bias in relation to gender equality within organisations. In this training women acquire skills to put themselves in the spotlight and become assertive and clear in their communication skills. Additionally by taking part in the training, this group of women instantly increases their visibility as they are introduced to high level decision makers at TNO.
- Optimizing the existing database for talent and HR development; The database is to be used as a conversation instrument to help talented (female) employees within TNO reach the next career step. It should be for all levels of movement within the organization (moving from junior→medior→senior→principal→executive position). The database is to be filled together by the research manager (RM), human resources business partner and talented (female) employee. Both an employee and the RM can subscribe the employee to the database. It is a two way road. Besides helping (female) employees actively work on their next career step, this database can also be used where vacancies are discussed such as the LD-committee.
- Adjusting the current way of conducting performance talks and general talent management within TNO. For example, one of the ways in which talent has been spotted and managed was a so-called 'Potentials' group (employees which are identified as being able to make 2 vertical steps in the coming 3 years). The way this group is spotted and how it will be managed is currently under evaluation and is being adjusted. LD and trainee manager are the owners of this activity, and JERRI project leader is giving input and feedback during the process to ensure that (gender) diversity aspect is taken into consideration well.
- Inclusion topic: one of the ways in which female employees can be supported to rise to the top of the organisation is by having an inclusive work environment. In order to draw attention to the issue of inclusion, a lecture and a workshop by a professor (lector) from the Hague University of Applied Sciences has been delivered at TNO Delft location. The lecture has been attended by more than 20 participants and has been made available online, while a workshop has been attended by roughly 15 research managers and programme directors of the Defense Unit. The lecture and workshop have been evaluated highly positive by participants.
- Female mentees from TNO (n=6) and male/female mentors (n=6) take part in Cross Mentoring Program. The program consists of 5 face-to-face group meetings and 4 individual mentor-mentee talks which take place between December 2017 and November 2018. Female mentees work on their next career steps with external mentors. Mentors from TNO (male or female) help female mentees from other organisations make next career steps and can hereby also become (more)

sensitive to gender issues that may play a role when it comes to visibility and career progression.

Collaboration with the following stakeholders and change agents is needed:

- Participation HR and LD

Planning:

- The Female Leadership training will be organized in Q2-2017 and Q2-2018; Report in Q1-2019.
- Database development and inclusion criteria to be discussed (Q3-4 2017) with LD management, Unit directors and HR; Applying database as form of pilots in Q2 and applied in Q3 and Q4 in the rest of the organisation 2018. Report on outcomes in Q1-2019.
- Adjustments to the talent management developed in Q1 and Q2 2018 by LD, applied in Q3 and Q4 of 2018.
- Cross mentoring programme applied in 2018.

	Q2 2017	Q3 2017	Q4 2017	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3
Female leadership training	App				App			Rep		
Female Talent Database development		Dev	Dev	Dev	Dev	App	App	Rep		
Performance talks and talent management (LD/Trainee manager owners of activity)				Dev	Dev	App	App	Rep		
Cross mentoring programme			App	App	App	App	App	Rep		

Dev = develop and try-out

App = apply or execute

Rep = document or report

Institutionalisation:

After JERRI project, Female leadership training will be part of the standard training modules on offer to TNO employees.

After JERRI project, female talent database will be embedded in the standard HR practice of Strategic Personnel Planning cycle.

LD/trainee managers are the owners of the activity, so during the JERRI project institutionalisation is taking place.

Cross mentoring programme is embedded in TNO's work as this comes along with signing the Talent to the Top charter (TNO signed it in 2016).

2.2.2 Create awareness on implicit bias with respect to gender

SMART goals:

- Organising a gender bias training for male TOP managers at TNO, and HR employees, consequently training 40+ staff., After each training, an evaluation form on usefulness of the training will be graded with a score of 4 (or more) on a 5-point scale.

Activities:

- Two Implicit Bias Trainings (senior managers; HR managers). To get the discussion started and increase the number of inner group champions. 40+ TNO senior managers and HR employees will be sent on a one day course on gender bias.
- Collaboration with the following stakeholders and change agents is needed: HR, Unit directors, Research managers.

Planning:

- Implicit bias training takes place for senior managers (Q1) and HR employees (Q3)

	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4
Create awareness on implicit bias	App		App		Rep			

Dev = develop and try-out

App = apply or execute

Rep = document or report

2.2.3 Other supporting activities for gender equality identified in JERRI D 5.1

These activities are additional to what has been identified in D3.2 in order to further support gender equality within TNO.

Smart goals:

- Developing and using gender neutral recruitment guidelines (as one of the ways to bring in female talent).
- Monitoring of (gender) diversity figures in order to know whether activities within TNO have a desired effect .

Activities:

- HR is the owner of the activity and JERRI dimension leader is giving input and feedback during the process. In case of personnel changes, someone from the diversity steering committee would take over the activities of the JERRI dimension leader.
- HR analytics team is supplying every quarter the gender dimension figures. Gender figures examined include for example the following: proportion of total female employees; proportion females in the Board of directors, 1st and 2nd echelon; proportion of females in the 3rd echelon; potentials; principals; salary (in)equality etc.

Collaboration with the following stakeholders and change agents is needed:

HR, HR analytics team, Women at TNO.

Planning:

	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4
Gender neutral recruitment guidelines	Dev	Dev	Dev	App	Rep			
Monitoring (gender) diversity	Dev	Dev/App	Dev/App	Dev/App	Rep			

Institutionalisation:

After the JERRI project gender neutral guidelines will be used when writing vacancy texts.

After JERRI project, women at TNO and diversity steering committee will follow up on monitoring the (gender) diversity figures.

2.3 Societal Engagement

The overall vision for Societal Engagement is that all employees of TNO, and also our clients and partners, are fully aware of the societal role of TNO and of the societal implications of the work of TNO. More specifically, the ambition is that TNO is able to make explicit for all of its 'program lines' (a level of detail that sits between a strategic roadmap and specific projects) how these contribute to achieving societal goals or solving societal problems, e.g., by referring to Sustainable Development Goals (SDGs) and/or in terms of creating innovations within the 'doughnut' (Raworth, 2017): not falling below social lower limits of people's wellbeing, not overshooting ecological upper limits of sustainability. The development of technology and economic growth are seen as means (rather than as ends in themselves) and human wellbeing and flourishing is

seen within TNO as a clear goal. TNO is perceived as creating value for society. TNO's tagline could be: 'Innovation for the Greater Good'.

In order to further develop, implement and institutionalize Societal Engagement at TNO, the following actions are planned (JERRI D3.2: pp. 22-26):

1. Involve societal stakeholders in Strategy Advisory Councils.
2. An 'Ethical and Societal Impact Toolkit' (already discussed above, in 2.1.2).
3. Share Best Practices in User Involvement/Citizen Science (synergy with Science Education).

These action plans were discussed and further developed in several meetings:

- An interview with an external brand managers (15 January 2018), about sharing best practices in user involvement;
- Two meetings with the Strategy Managers (January 2018), about involving societal stakeholders in Strategy Advisory Councils.

In our analysis of barriers and enablers (D5.1) we found that, on the one hand Societal Engagement is an integral part of TNO's *informal* organizational culture, but, on the other hand, that there are relatively few *formal* roles or responsibilities for Societal Engagement. Our strategy for the institutionalization of Societal Engagement therefore focuses on creating clear roles and responsibilities; e.g., in the recommendations for involving (more) societal stakeholders in newly to be formed Strategy Advisory Councils of the new Units of TNO (as per 2018). Unclear roles and responsibilities are a barrier. Clarity is an enabler. Furthermore, we expect that too many or too complex processes will also pose a barrier. We therefore aim to combine ('hard') formal measures with an appeal to people's ('soft') intrinsic motivations, e.g., in the development of the Societal and Ethical Impact Toolkit; this Toolkit will focus on a Canvas, that is meant to facilitate discussions and creativity, and not focus on many and complex checklists (which would stress compliance).

Moreover, the new organizational structure of TNO gave us opportunities to embed formulated changes in formal structures e.g. including societal stakeholders in new to be formed Strategy Advisory Councils instead of a Separate Advisory Council.

In Figure 5 the relationships between current activities in JERRI, the strategic plan, and the longer-term vision for Societal Engagement (and CSR) are illustrated.

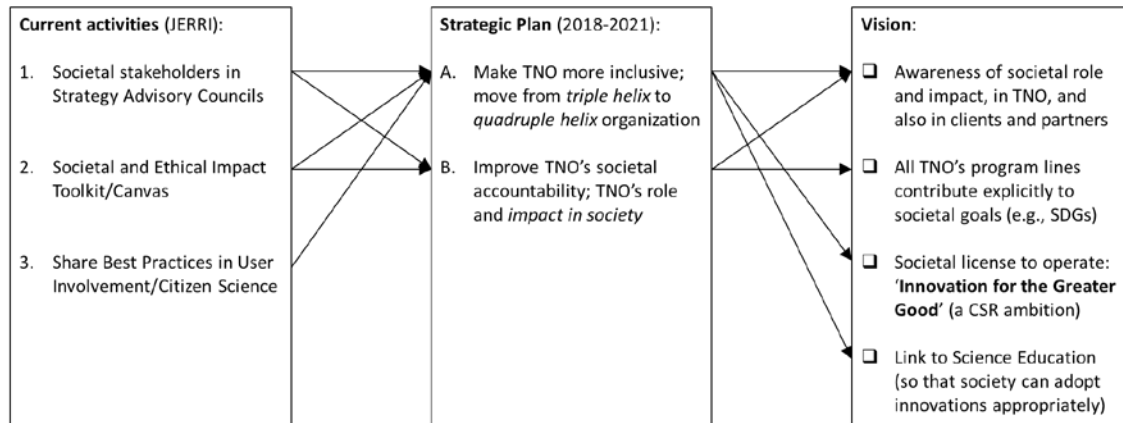


Figure 5: Relationships between: current activities for Societal Engagement in JERRI, Strategic Plan, and longer-term vision for Societal Engagement

These actions are presented in more detail below:

2.3.1 Involve societal stakeholders in Strategy Advisory Councils

TNO currently has dialogues with stakeholders, e.g. in the Strategy Advisory Councils (SAR). These SARs, however, are dominated by industry, government and academia³. TNO wants to broaden the dialogue with society, e.g., to include other, 'unusual' stakeholders. This will boost trust in TNO as an organization that is also concerned with society (and not just with industry, government and academia). TNO has a new structure, as per 2018, consisting of 9 new Units, each with a new Strategy Advisory Council. The process of creating these new Strategy Advisory Councils is coordinated by strategy managers (TNO Strategy department). Unit directors are responsible for the composition in close collaboration with the Chief Scientific Officer. The executive board appoints the chair and the members of the councils.

SMART goal:

- TNO includes one societal stakeholder in each of the (new) 9 Strategy Advisory Council; one for each new Unit (in JERRI D3.2, the goal was to have "two 'unusual' stakeholders" in each Strategy Advisory Council; we adjusted this goal down to one, in order to be better aligned with the intended size of the councils and more realistic (better achievable).

Activities:

³ Out of the 58 people in the five SARs (TNO Annual Report 2015), 29 were from industry, 13 from government, 7 from academia, and (only) 4 from not-for profit organizations or NGOs; moreover, gender diversity was rather poor, with only 7 female out of the 58 people.



- Prepare this action in close collaboration with the strategy managers (done in 2017).
- In February 2018 we monitored the progress and saw that there is some delay in the formation of the Strategy Advisory Councils, and that no societal stakeholders were yet added. We therefore took two additional activities:
 - Reminder to the Strategy manager to remind the TNO Board;
 - Reminder to Unit Directors (busy with setting-up a new organisation (unit)).
- In April 2018 facilitated by discussing possible societal stakeholders for each unit.
- Unit directors select and invite these new ('unusual') societal stakeholders, facilitated by Strategy managers (Q2-Q3). Next to societal stakeholders, units also select intended members by age and gender, but not every intended member is willing to commit, mostly due to time constraints.
- Board (RvB) appoints members of the Strategy Advisory Council.
- Organize first meetings with these new Strategy Advisory Councils (Q3-Q4).
- Evaluate the added value of these new members and their effects on the meetings.

Collaboration:

- Strategy managers;
- Unit directors (= responsible for the Strategy Advisory Councils);
- Chief Scientific Officer;
- Strategy director.

Planning:

- Involve Strategy managers: already done in late 2017, in order to use this window of opportunity;
- Facilitate discussion on composition (kind of stakeholder, gender and age) between unit director and board.

	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4
Involve societal stakeholders in Strategy Advisory Councils	App	App	App	Rep				

Dev = develop and try-out

App = apply or execute

Rep = document or report

Institutionalization:

- After the JERRI project, the new Strategy Advisory Councils will continue to exist.

2.3.2 An 'Ethical and Societal Impact Toolkit

This action plan was already discussed in the section on Ethics; it is a combination of the 'Ethical and Societal Issues' tool of Ethics, and the 'Societal Impact Tool' of Societal Engagement).

2.3.3 Share Best Practices in User Involvement (Citizen Science)

TNO is well-known for its expertise in technology. Its expertise in 'user involvement' is, however, less well-known; e.g., involving police officers, hospital nurses, truck drivers, etc. in research and innovation projects as 'citizen scientists'⁴. TNO would like to present its best practices in user involvement to a wider audience, both within TNO and outside TNO.

SMART goal:

- TNO communicates 4 'best practices' in 'user involvement', both within TNO and outside TNO.

Activities:

- Identify 4 'best practices' of 'user involvement' in projects, and document these;
- Select communication channel: TNO TIME to communicate these outside TNO;
- Select communication channel: Intranet and Yammer to communicate these within TNO.
- Explore possibilities to combine efforts for this goal with a new appointed internal review committee on human research (further discussion follow Sept. 2018)

Collaboration:

- Four Units, to provide these 'best practices';
- Internal review committee on human research;
- Marketing and Communications, editor TNO Time and unit consultants to communicate.

Planning:

- Identify and document 4 'best practices' (preferably with the internal review committee);
- Communicate these within TNO, TNO City (intranet);
- Communicate these outside TNO, in TNO Time, column: 'from the shop floor' (how we do our research).

⁴ Citizen science ... is scientific research conducted, in whole or in part, by amateur (or nonprofessional) scientists. Citizen science is sometimes described as "public participation in scientific research," participatory monitoring and participatory action research (source: Wikipedia).

	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4
Share 'best practices' in 'user involvement'		Dev	Dev	App	Rep			

- Dev = develop and try-out
- App = apply or execute
- Rep = document or report

Institutionalization:

- After the JERRI project, there will probably be other examples of user involvement in the column 'from the shop floor' in internal and external communications of TNO.

2.4 Science Education

The goal, ambition and vision for the RRI dimension was elaborated from D3.2. Since the inception of the goals, TNO has been in contact with external stakeholders to create a better understanding as to underline why TNO should involve itself with this dimension.

Starting position of TNO has been that more than often Sciences Education is considered a secondary activity (not a need to have, but a nice to do); and that there is a 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.

Vision development

Based on the lessons learned from D5.1 we argued that TNO could benefit from a wider strategy where we, as an organization, state why we pursue Science Education activities. This organisational sense making is required and could form the basis of our legitimization of activities.

The long term vision should be the 'new normal' for TNO. Basis for the 'new normal' ties directly to the ambition of becoming an '*R&I organisation for and with society*'. A wider and more inclusive TNO (quadruple helix RTO) is considered key to relate to society in a meaningful way. For sciences education this means that TNO can genuinely engage with (and involve) societal stakeholders in a pro-active and meaningful way. Therefore, the link between Science Education and Societal Engagement is quite close; relating to society in a meaningful and respectful way, bridging (if any) gaps between two worlds.

The purpose of an applied research organisation is to apply inventions in society (innovation) and use/apply them. The transfer of knowledge towards society is

essential; as TNO is an applied research organisation; if inventions are not applied in practice; innovation is halted and the impact on society is missed. Therefore the relation between society and TNO is reciprocal.

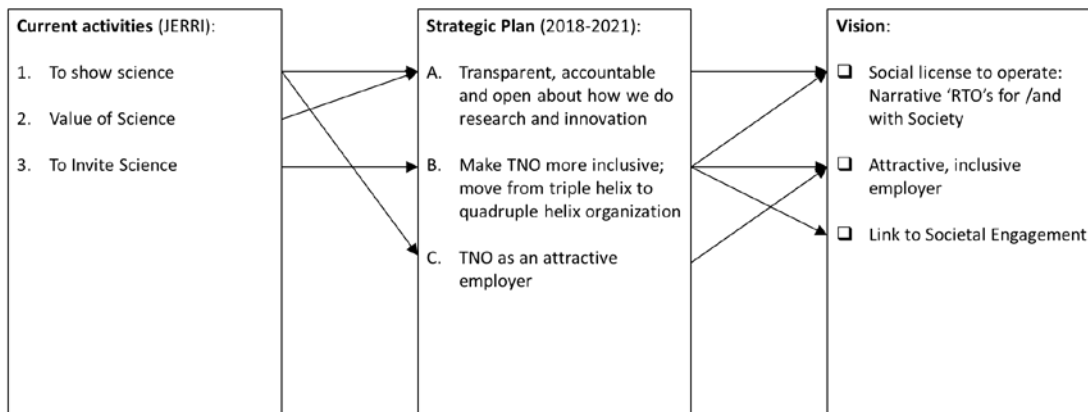


Figure 3: Relationships between: current activities for Science Education in JERRI, Strategic Plan, and longer-term vision for Science Education

Included in the Strategic Plan of TNO and the CSR Strategy 2018-2021 is the ambition to transform TNO into an 'even better' RRI organisation where impact creation is important. In this frame we include how we aim to create these: sustainable, ethically acceptable and socially desirable. This approach emphasizes the multi-dimensional, dynamic and co-productive ties between all actors in the quadruple helix innovation system. At the same time we as an organisation aim to be as open and transparent as possible about how we conduct research and innovation projects; we can be openly held accountable for how we do our research and the quality of our results.

Important aspect for TNO is that by engaging in this RRI dimension, the so called 'license to operate' is continuously renewed through and with society; by engaging with society and position the role of applied science and innovation in the societal discourse as a distinct added value; goodwill towards the role of RTO's and TNO in specific (and its associated funding requirement) is granted.

By formulating the following goal setting ambitions, TNO will increase the awareness of specific target groups and the general public in ways that will help to lower the threshold between science and application of science. This will be done by inviting stakeholders to experience and/or witness science 'in action' and to be (publicly) open and accountable about how science is performed in TNO. The aim is to increase the trust in and attractiveness and openness of conducting applied research and to show insight in career opportunities for specific stakeholders, but also to allow people to learn, experience and share the joys of applied science through interaction with staff and project results.

TNO has formulated three action points (to show science, to champion the value of science and to invite society) that relate to individual goals. These goals were

discussed in the Advisory Board, and subsequently improved and then approved by the CSR Steering Committee (31st of May 2017).

In order to further develop, implement and institutionalize Science Education at TNO, the following actions are planned (JERRI D3.2: pp. 26-30):

- To show science;
- To champion the value of science;
- To invite society.

2.4.1 To show science

Goal: To increase the visibility of applied science in society in a more stratified way.

TNO does communicate to society at large through various online and off line channels and reaches out to many different audiences. The online magazine TNO TTime⁵ has a large audience in terms of readers (100.000+ views) and serves as a first popular introduction to a topic. A call to action, or more in depth material can be found for those who seek out more information regarding a specific topic. The way in which TNO uses various online channels is mostly 'one way communication'. A proposed action is to boost the content of TNO Time. This can be achieved using the projects stemming from paragraph 2.3.3.

The contrast between creating a larger audience and creating specific audiences seems counterintuitive; A larger audience does not necessarily mean more impact. Clever choices in which messages to communicate to whom should be elaborated. From a recruitment perspective 2nd career women and STEM-students seem a natural target group.

There are also natural (offline) events, such as the 85 years existence of TNO in 2017, or events that are aimed at 'getting to know TNO', that present opportunities for offline interaction with society or parts of society. Proposed is to organize more 'open days' on location i.e. 1 or 2 locations per year in a structured way; making use of natural moments that coincide with external agenda's such as the Weekend of Science.

Activities: Online; more diversity in projects (specifically projects with Citizens Scientist participation and involvement).

Expected impact: Larger audience (more interaction) and specific audiences (secondary /higher education)

SMART goal: Increase the type, diversity and number of contributions in TNO TIME; this would comprise a shift in written articles to more diversified content

⁵ <https://time.tno.nl/en/>

(current status 95% articles - 5% interactive) to 75% articles – 25% interactive in 2018.

Internal alignment & Collaboration: Marketing & Communications.

Budget: no budget requirement; goal to be achieved in conjunction with 2.3.3.

	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4
To Show Science			App	App	App	App		

Institutionalization: This goal is tied to both societal engagement and our CSR Strategy document (2018-2021) about our wish to be more explicit about the impact creation of TNO. The activities are aligned with the Marketing & Communications and will help to demonstrate the effects of a more diversified way of presenting about TNO’s projects and impact. By doing so, the a ‘new’ normal is established.

2.4.2 To champion the value of science

Goal: To promote specific projects or topics with a motivation to ‘demonstrate’ and ‘communicate’. Trustbuilding seems to be a key aspect here.

The RRI dimension of Science Education ties into a societal discussion about sciences as a trustworthy source. The idea of ‘alternative facts’ as a popular method to destabilize debates based on facts, towards debates based on meaning or alternative facts. This is seen by stakeholders as an argument to promote the idea of Sciences Education; by helping society to understand science, scientific processes and methods, it could be argued that the ‘license to operate’ for science-based institutions such as TNO is validated and promoted if done effectively.

TNO has formulated a goal where it would (publicly) share how science is done at TNO (Scientific Integrity), which has been formulated in the TNO Code of Conduct and by introducing exemplary case studies of how science and fact based reasoning helps to formulate positions in sensitive dossiers. The ambition is to allow one or two cases per year to be detailed out with additional information/graphics and illustrations in such way that a wider societal audience is able to understand how science, scientific methods and scientific reasoning leads to certain outcomes and positions in a public debate. This exemplary case study could be made available with for instance educational organizations.

Activities: Public statement on scientific integrity; Sensitive Dossiers sharing

Expected impact: Trust in fact based science, openness

SMART goal: Make a public statement on TNO website how we do projects and are accountable for our scientific integrity in 2018

SMART goal: Share at last two sensitive dossiers per year

Internal alignment: Corporate Science Office, Public Affairs & Integrity Officer & Marketing & Communications;

Budget: 10k

	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4
To Champion the Value of Science			Dev	App	App			

Institutionalization: This goal is tied to both our Integrity Board and our CSR Strategy document (2018-2021) about our wish to be more openly explicit about how we perform research and can be held accountable for this. The activities are considered a priority for the Corporate Science Office, as part of the TNO Strategy department. The activities are aligned with the effort on the national Code of Conduct on Scientific Integrity (see also 2.1.3.)

2.4.3 To invite society

The third goal set has an ambition to open up TNO. The CEO of TNO has declared that he wants to ‘open’ doors and windows to the outside world and show the world what a beautiful organisation TNO is. The actions resulting should lower the threshold/barrier to interact with TNO, TNO staff and TNO locations (whilst preserving safety and security at those places where this is required).

Proposed activities entail the organization of open days; locations could be opened up for neighbours, local councils and interested societal stakeholders and presentations and demonstrations could be given. The ambition is to align these open days with natural moments in the national calendar such as the Weekend of Science⁶. The event in 2017 has been held in October, with high level support from TNO as it coincided with TNO’s 85th anniversary. Key question now is if TNO will take part in the upcoming events in the weekend of science (2018 and further).

For Citizen Empowerment; opportunities could be created to interact more thoroughly through specific channels. One way of dealing with this is to structure the process to find information about events through a calendar and have a type of CRM system in place for request from interested stakeholders/schools/students. This would enable TNO to move from ad-hoc responses to requests, to structuring responses and managing the influx of questions. The goals would be to develop an information portal

⁶ www.weekendvandewetenschap.nl; weekend of science is an annual event in which 200+ organisations (universities, museums, research organisations and companies) open their doors for the general public and host a serie of onsite activities.



on the TNO website aimed at managing interaction with TNO from society in a structured way.

One step further: even societal research questions could be posed to TNO and solved, based on for instance crowdsourcing. (Crowdsourcing is a specific sourcing model in which individuals or organizations use contributions from users to obtain needed services or ideas. Crowdsourcing can come from an undefined public (instead of being commissioned from a specific, named group) and in that crowdsourcing includes a mix of bottom-up and top-down processes. Sciences Education ties in with this crowdsourcing as a way to interact with society in order to define and execute specific types of research and links with the dimension of Societal engagement.

Proposed activities: Open Days; Managed interactions through information portal, reconnaissance of crowdsourcing platform

Expected impact: Goodwill & Social License to operate increase (locally & nationally)

SMART goal: Open Day 2018/2019 on location of TNO;

SMART goal: Managed information portal for society on TNO Website;

SMART goal: Develop relations with crowdsourcing platform.

Internal alignment: CSR Officer, Units, Marketing & Communications

Budget: 32k

	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4
To invite Science		Dev	Dev	App	App	App	App	App

Institutionalization: This goals are tied to both our Marketing & Communications department and our HR department and Units. The practical organisation of these events are partly regular activities; by aligning these with JERRI, proper attention at different levels can be organised so we can develop in terms of maturity from Ad-hoc to structured, and develop institutionalized logics as to why we do these types of activities.

2.4.4 Synergy across RRI Dimensions

The activities in goal 1 'to show science' is directly linked to societal engagement. Through varying in form, we can elaborate to what extent different forms of expression work best for specific target groups. This would enable TNO to better align the content of the message to the target audience and be able to share these lessons.

The activities on goal 2 (To champion the value of science) are aligned with the RRI Dimension of Ethics. Scientific Integrity is one of the important internal ambitions of TNO; as such it has yet not made it to an explicit external commitment. The Integrity

Commission of TNO and CSR Steering Committee has recently committed to pursuing similar goals in terms of sensitive dossiers.

New activities are being proposed on goal 3 (To invite society); there is a clear link between these proposed goals and the dimension of Societal Engagement. Links with local networks will be further explored, as interaction with external stakeholders seem fruitful in this respect.

2.5 Open Access as part of Open Science

The overall ambition for Open Access is to improve the ways in which TNO shares research data and results, and its Open Innovation practices, i.e. the sharing of knowledge with other parties for collaborative innovation, which are in fact elements of Open Science. Based on consultations with internal key stakeholders and workshops we have come to the next tripartite of what Open Science is about for TNO:

- 1) **Open methodology**, e.g. publish methods prior to experiments themselves. However, for the time being this element has less priority to be embedded in the current organization.
- 2) **Open data**, social pressure on sharing (EARTO), integrity code (disclosure unless valid reasons). The starting point should be "public, unless" (EARTO position) and the "unless" very well documented.
- 3) **Open Access research results**, publications and reports.

Within this JERRI dimension we elaborate on Open Access as part of the broader Open Science perspective and debate in TNO.

To put Open Science into practice, care is of course required, as research at TNO strongly varies between focus points like healthcare, energy, homeland 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 this 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. If we specifically talk about Open Access, then TNO has four reasons to streamline publication procedures (and assorted questions). Two of them fuelled from within the organization, and the other two from outside TNO:

1. Compliancy with **national (Dutch) legislation is necessary**. The "Archiefwet" and the "Wet Openbaar Bestuur" stipulate the need for a clear policy in publication policies, with an emphasis on openness towards society. TNO must

- be able to give a sound explanation why some public funded studies have not been published in the public domain.
2. The **societal trend for openness** cannot be denied, and this creates the need for clear rules and procedures. If Open Access in some cases cannot be supported, this refusal must be based on solid arguments.
 3. The **internal confusion on publishing rules** leads to inefficiency, since TNO scientists and librarians lose valuable time sorting out the publishing conditions on a project-by-project basis. Streamlining the publication procedures is necessary to avoid the loss of potential scientific impact.
 4. The **unclear rules and procedures** can in some cases lead to ineffective processes. For example, when wrong publication choices are made, this could ultimately damage the TNO market position. This is particularly the case when Intellectual Property is involved. Therefore, IP should be the basis for OA policies within TNO.

Identified drivers for Open Science are:

- **Quality increase:** others take part, press good use statistics, data management plan
- **Business creation:** new opportunities by sharing data, exposure / networks, etc

TNO Vision – ‘Open where reasonably possible and Restricted where reasonably required’.

During the process of internal consultations and workshops, the contours of a long-term Open Access vision have emerged in which TNO follows the EARTO⁷ point of view 1) ‘Open where reasonably possible and Restricted where reasonably required’ and 2) Open Access is institutionalized as the part of the broader Open Science perspective, 3) a cultural change to a proactive entrepreneurial attitude towards Open Science is entrenched within the different layers of the organisation and 4) the business opportunities that Open Science offers can be redeemed. There is a certain degree of sequentially in the four main parts of the vision.

Open Science is of increasing importance for science and economic growth. That is why government funding programs increasingly impose specific requirements that are motivated by Open Science. In addition, the first experiences at TNO show that in some cases Open Science can have positive effects on market turnover. However, it should be noted that the benefits of Open Science do not apply to all domains and activities of TNO, most important exceptions:

- Research linked to Defence, Security and State Security.
- Contract research for companies.

⁷ European Association of Research and Technology Organisations

- (Contract) research that should lead to IP.

The development of the strategy and implementation plan focuses on those TNO activities and projects that are eligible for an Open Science/Open Access approach.

Towards a strategy and implementation plan

An overarching TNO strategy and implementation plan with respect to open (reusable) science market development, and underlying technological development, is currently lacking. This is understandable, given the complexity of the topic and the differences between TNO domains. However, a reactive attitude, in which TNO restricts itself to complying to rules for open access, re-use and infrastructure associated to certain public research programmes (e.g. in H2020) involves risks. Such an attitude, where Open Science policy is only perceived as a cost, threatens TNO's position in multiple ways. Most importantly, it ignores the potential market and scientific multipliers (based on enhancing the user base, sharing and reuse), and bears the risk that others will overtake these positions. The main parts of the Strategic Plan (2018-2021) are (1) Open Science Policies and implementation plan, and (2) a Business and IP strategy;

Some recommendations in this context are:

- **Governance:** Strengthen the TNO position as a defining and connecting player, for example by taking the lead to an Open Science policy in TO2 context, in consultation with the Ministry of Economic Affairs and Climate or by developing an active role in the Dutch and European Open Science network⁸.
- **Operations:** Formulating an ambition on Open Science can and must be well thought through up to and including implementation. The direction of the policy, the organization of systems, procedures and working methods and the day-to-day performance by the employees must be well coordinated. Potentially, an Open Science approach can mean a lot to TNO (both in content and in quality), but in an organization where confidential and closed contract research also takes place, the proper arrangement of both at the same time is a matter of carefulness and consistency in policy and implementation. It is relatively easy to define various treatment methods for research from an organizational perspective. But from the scientist perspective it must be clear how he or she does the work. A form of execution must therefore be chosen that is clearly and consistently applicable.
- **Propositions:** It is important that market directors are given the opportunity to develop new Open Science propositions based on a proactive, entrepreneurial attitude. Develop accompanying guidelines for open science propositions supported by SWOT, social cost-benefit analysis and

⁸ Memo, Kruyt genootschap, 'Open Science op maat', TNO, september 2017

business case analyses. In addition, Open Science guidelines for propositions for knowledge investment plans, for example as part of the ERP program (early research programmes)⁹.

In order to further develop, implement and institutionalize Open Science including the specific element of Open Access, the following activities, which are briefly displayed in the first column of the figure below, are performed.

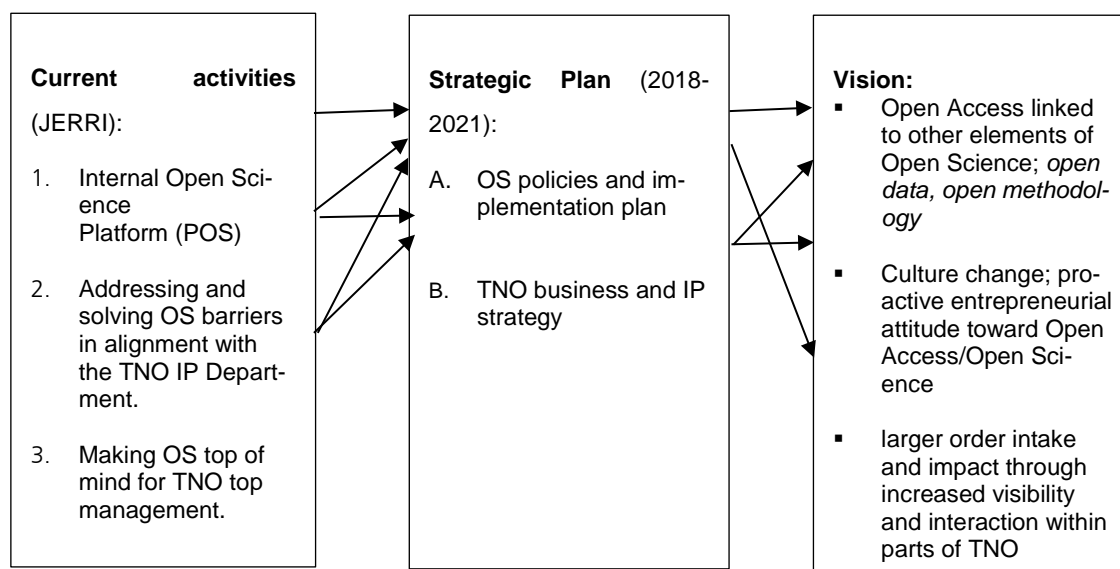


Figure 6: Relationships between: current activities for Open Access in JERRI, Strategic Plan, and longer-term vision for Science Education

These current activities mentioned above are further explained in the paragraphs below.

2.5.1 Platform Open Science (POS)

Goal: to establish an (internal) Platform, to propose and execute the planning of guidelines and policies on Open Access and related Open Science topics.

The Platform Open Science (shortly POS) was established in September 2017 with the aim of bringing together various internal stakeholders and various opinions about Open Science.

The reason for setting up the platform is that TNO is increasingly confronted with Open Science, as said a collective name for Open Access and Open Data. In principle, these government initiatives (national or EU) aim to make the complete results and data collections available to the citizens of all research that has ever been subsidized with tax

⁹ Memo, Kruyt genootschap, 'Open Science op maat', TNO, september 2017

money. Such disclosures can sometimes be difficult to relate to the contractual obligations that TNO enters into with its customers in order to protect their IP (intellectual property). At the moment no policy has yet been formulated in this area at TNO.

TNO as an organization is finding it hard to make decisions and set goals for Open Science. This is because this field is relatively complicated and develops through by case-per-case judgements of individual scientists to either comply or not comply with requests (i.e. a high degree of decentralized decision taking). There is, thus, a need for a company-wide policy, guideline or ambition. Moreover, there is a lack of practical knowledge within the TNO organisation on the implications of different ways of dealing with Open Science issues. There are sometimes dogmatic beliefs within TNO; some advocate a 'totally open' approach, whereas others advocate a 'totally closed' approach. In practice, however, different approaches will be needed, and there will be many exceptions.

A first key goal regarding POS therefore was to have an open debate on different approaches. The aim of the first POS workshop, October 2017, was to create a picture from various angles, which are the opportunities and risks for TNO when it comes to Open Science in relation to the IP strategy; and jointly explore what actions TNO should take in this area.

The aim of the second POS workshop, March 2018, was gathering insights to come to a policy recommendation on OS in a relatively short time, addressed to the Board of Directors. Interactively moderated discussion focused, among other things, on the questions:

- What are the preconditions for an Open Science policy?
- How can such an OS policy be implemented in practice?
- What actions are needed?

Main outcome of this workshop is to draft an Open Science memo includes points such as:

1. Further elaboration of open science (methods, data, results);
2. What are the requirements imposed by governments, funding organization, customers on public making;
3. What are the limitations that exist from legislation;
4. What are the drivers for TNO regarding open science (quality increase and business creation);
5. What position does TNO take regarding open science: with regard to open data (for instance 'open, unless' (EARTO position), and the 'unless' well defined on points 2 and 3);
6. Consequences for our IP policy, contract forms and work processes.

SMART goal: Policy memo on Open Science for Board of Directors in Q2 2018

Internal alignment: IP Taskforce, Marketing & Communications, Director Operations, Corporate Science Director and other members POS platform.

Planning:

	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4
Policy memo on Open Science	Dev	Rep						

Dev = Develop

Rep= Report

Institutionalization:

In order to bring rhythm in the process to regularly address Open Science within different layers of the organization a(n) (internal) Platform (POS) was established to facilitate the internal discussion about this subject, in the form of workshops, discussions and personal conversations. As a result, we see that the reasons why TNO should focus on Open Science are shifting. From a state of coercion imposed by the government, there is now a growing awareness that there may also be advantages to the pursuit of Open Science. For the further embedding of Open Science in the organization, POS will transfer the baton to a person in the higher management layer, so (s)he can take the responsibility for this subject in the longer term and (s)he is able to facilitate the process. When we talk about the institutionalization of the three components of Open Science, we see the following:

- The topic Open Access policy is clear in general terms, for the institutionalization an implementation and communication strategy should be drawn up.
- The topic of Open Data policy is not yet clear, the first step should be to explore legal and practical risks.
- The topic of Open Models & Methods is still very unknown field and it requires a first exploration.

2.5.2 Addressing and solving OS barriers in close alignment with TNO IP Department

Goal: Getting a picture of the main barriers to the implementation of Open Science, and agree on solutions for these issues.

Within TNO, it seems that IP is seen as one of the most important barriers. An experience in this context gained from the collaboration with the Fraunhofer-Gesellschaft is the following. There is an opposite position between Fraunhofer's situation and TNO's situation with regard to OA / OS. Fraunhofer is dealing with a situation in which the top management is enthusiastic about the implementation of a OS/OA policy. However, in practice, it is difficult for them to find support for the implementation of such a policy by researchers. This is in contrast with the TNO situation. Within TNO there is a continuous growth of Open Access publications 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. At the same time, from the top management perspective, there are concerns about the impact of Open Science on the IP policy.

The basis for this barrier lies mainly in the current business model of TNO. TNO follows the so-called Open Innovation (OI) business model; this model stands for 'value creation and value capture'. From that perspective, Open Science can be a barrier for the OI model. 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 Science 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 ultimately 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, and to exclude these from OA. Once that is implemented in the workflow of publications, full support on Open Science from management becomes possible.

SMART goal: consultations with IP Taskforce to align OS policy with IP interests

Internal alignment: IP Taskforce

Planning:

	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4
Addressing and solving OS barriers in close alignment with TNO IP Department		Dev	Dev	App	App			

Institutionalization

TNO follows the EARTO’s point of view with respect to Open Access: “open where possible, closed where necessary”, in particular because Open Science may be at odds with intellectual property (IP, IPR) and the use of market opportunities by TNO or TNO clients. However, the development of Open Access seems inevitable, but we do not yet know much about the consequences because research on impact of Open Science is still very young. What we know is that each of the components of Open Science (open access, open data and open models) has its own dynamics and problems. For further institutionalization, barriers to implementing Open Science can be insightful by permanently monitoring/following the development of Open Science in TNO, providing internal advice about it and benchmarking it with other RTO’s. In addition, it is important that there is a contact point within the organization for questions about Open Science, so that researchers can be facilitated in this.

2.5.3 Making Open Science top of mind for TNO top management

Goal: to attain a focus of interest on Open Access at the highest decision making level.

As the dimension of Open Access has not reached the level of institutionalization (see also D3.2), the goalsetting process therefore started by consulting internal strategic key-persons related to the topic of OA and discussions with external stakeholders.

During this wide consultation round, it was suggested that the first OA ambition should be to attain a focus of interest on OA at the highest decision making level and set up

guidelines that establish how TNO wants to operate successfully in an environment that continuously requires more and more open science (open data and open access).

In order to create this OA platform it became clear that the topic itself deserves proper attention and an ‘owner’. Different internal stakeholders should need to devote time to this topic in order to devise a way forward and to propose company policies and guidelines. It is likely that representatives from the TNO departments that deal with publishing, IP, legislation and OA need to step forward in order to do this.

Smart goal: Policy document for new policy specifically regarding Open Access to Executive Board

Internal alignment: Director Operations, Corporate Science Director, Board of Directors

	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4
Making OS on top of mind for TNO senior management (policy document)					Rep			

Institutionalization

Open Science is preferred by a significant number of TNO researchers, as demonstrated by the strong autonomous growth of Open Access publications in the past 4 years. Scientists receive up to 5 times more response to their publications (source: NWO), if they are placed on an Open Access medium. Open Access is therefore an incentive for the scientific career of the individual TNO researcher. However, for the institutionalization, the support of the highest management layers is also crucial. For that reason, not only the Board of Directors has been involved with Open Science institutionalization process, but also the Supervisory Board has addressed questions on this topic in their meeting. The Supervisory Board has stated to monitor this subject closely in the near future. The board of Directors is expected to allocate funding to facilitate the institutionalization process.

3 Discussion

The JERRI project successfully progressed from the stage of goal setting (D3.2) to detailing out how the goals should be developed further and how the individual activities are embedded in the context of the (changing) TNO organisation. Awareness of the context, and finding effective ways for institutionalization is as much part of the development of the road map as detailing out activities. A great effort has been made to make use of the identified barriers and enablers and use of change agents from inside (and some outside) the organisation. The focus on embedding the JERRI project in TNO's new structure and seeing it as part of an organisational change project has helped to give indications for the roadmap development. More importantly, by focussing on life after JERRI and iterative discussion with (internal) stakeholders, clear links have been established to increase the 'survivability' of individual activities and actions.

A first observation that can be made is that there were relatively many interactions with change agents *within* TNO, and relatively few interactions with people *outside* TNO. This was already observed during goal development (JERRI D10.2: pp. 8-9); we can justify this approach by arguing that for both the analysis of barriers and enablers for institutionalization, and for the solving of barriers and the creation of enablers, interactions with change agents within TNO are likely to be more useful than interactions with people outside TNO. This is of course also part of our research method (action research). Also the activities we perform and change agents that we require are to be found inside our organisation. Incorporation of external perspective through the lens of change agents (experiences, contacts, opinions) are incorporated, but these could be filtered or are simply missed as they occur (to a large extent) outside the scope of JERRI.

Still, it is a signal that it seems that we favour *internal* interactions over *external* interactions. This can be partly solved by focusing on external interactions whenever these are at hand — and where TNO perceives interactions with the outside world as useful and feasible. For JERRI, this means, e.g.,

- A focus on communicating its commitment Scientific Integrity to external parties, for Ethics;
- A focus on the inclusion of societal stakeholders in the Strategy Advisory Councils and on sharing best practices in user involvement, for Societal Engagement;
- A focus on most activities in Science Education;

One of the things we learned (D5.1) is that close collaboration with TNO Services Organization is needed for successful institutionalisation. A quick look at the structure reveals that JERRI is engaging with almost all departments of the Services Organisation.

Structure of Services organization (underlined the internal stakeholder JERRI engages with):

- Business Information & Operations Services(BIOS):
 - Information Services
 - Corporate Real Estate & Facilities
 - Operational Excellence & Auditing
- Finance, Procurement & Legal:
 - Corporate Controller
 - Group Controller (Business and Contract Support)
 - Corporate Legal
 - IP & Contracting
- Human Resources:
 - Labour Affairs
 - HR
 - HRD / OD
- Marketing & Communications
 - Public Affairs
- Strategy:
 - Intelligence and Relations
 - Corporate Science Office

We have established that for the successful implementation and follow up of JERRI activities, it is essential that we can transfer 'results' of JERRI towards the Services Organisation. As they seem to be the ultimate beneficiary for most activities where a product or deliverable (training, game, website portal) is created. A committed beneficiary that is aware and willing to use and take care of the results will increase the success of the institutionalisation of JERRI.

Where the activities of JERRI are focussed towards awareness, organisational change, and ethical deliberation and where effects in behaviour, attitudes and decisions are expected, we see a targeted effort with support from senior management and a supporting structure in the form of steering committees and boards, to help and support this change process.

Not directly attributable to JERRI but in some way already an indication of a more and inclusive approach is the composition of internal governance boards (as part of the changed organisation), that now have by default a junior member in the form of a trainee.

3.1 Summary of Actions

Beneath we present an overview and summary of JERRI activities:

	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1
Ethics					
Improve ethical awareness	Dev	Dev	App	App	Rep
An 'Ethical and Societal Impact Toolkit'	Dev	Dev	Dev	App	Rep
Scientific integrity e-learning module			Dev	App	App/Rep
Gender Equality					
Female leadership training		App			Rep
Female Talent Database development	Dev	Dev	App	App	Rep
Performance talks and talent management	Dev	Dev	App	App	Rep
Cross mentoring programme	App	App	App	App	Rep
Create awareness on implicit bias	App		App		Rep
Gender neutral recruitment guidelines	Dev	Dev	Dev		
Monitoring (gender diversity)	Dev	Dev/App	Dev/App	Dev/App	Rep
Societal Engagement					
Involve societal stakeholders in Strategy Advisory Councils	App	App	App	Rep	
Share 'best practices' in 'user involvement'		Dev	Dev	App	Rep
Science Education					
To Show Science			App	App	App/Rep
To Champion the value of Science			Dev	App	Rep
To invite Society		Dev	Dev	App	App/Rep
Open Access					
Policy memo on Open Science	Dev	Rep			
Developing and solving IP/ OS barriers/		Dev	Dev	App	App/Rep
Making OS top of mind for senior management (policy document)					Rep

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