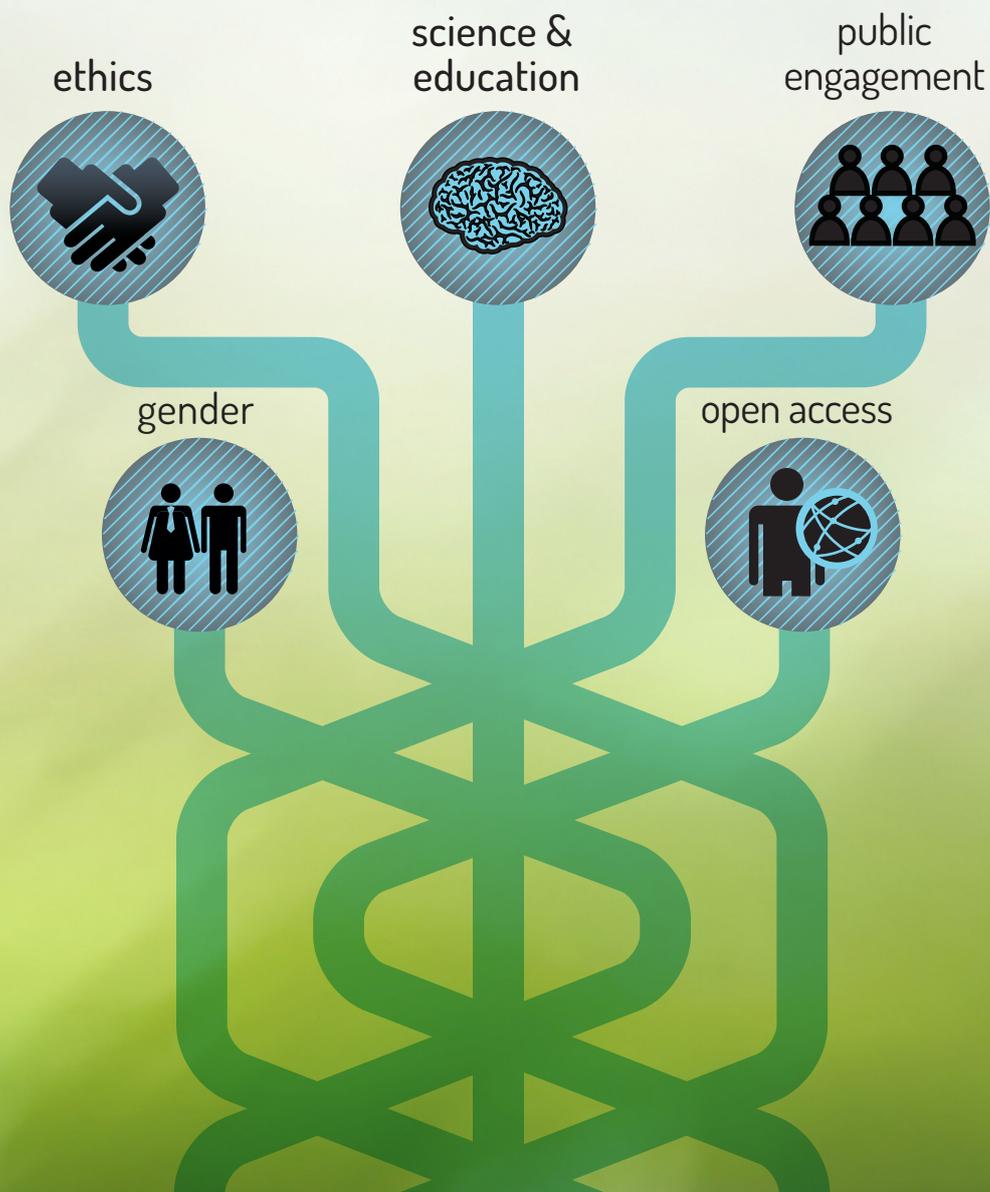


Description of specified RRI goals at Fraunhofer

DELIVERABLE D2.2





JERRI – Joining Efforts for Responsible Research and Innovation

Deliverable D2.2

Description of specified RRI goals at Fraunhofer

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PURPOSE

As Deliverable D2.2 of the EU project 'Joining Efforts for Responsible Research and Innovation' (JERRI), this report specifies the ambitions related to responsible research and innovation practices the Fraunhofer-Gesellschaft and its stakeholders developed in the project. As part of Work Package 2 "Development of RRI goals at Fraunhofer", the development of these goals evolved around five workshop-based processes related to five key dimensions of Responsible Research and Innovation (RRI) – Ethics, (Public/Societal) Engagement, Open Access, Gender Equality and Science Education. Beyond a mere description of the developed visions, long-term orientations and goals, concrete actions that are planned as part of Work Package 6 'Implementation Process at Fraunhofer' are already outlined, and commonalities and links across the different fields are delineated. The deliverable is the counterpart of D3.2 in which TNO specifies its goals for RRI.



EXECUTIVE SUMMARY

The EU project ‘Joining Efforts for Responsible Research and Innovation’ (JERRI) is orchestrating a deep RRI transition process within the two largest European Research and Technology Organizations (RTOs), the German Fraunhofer-Gesellschaft and the Netherlands Organization for Applied Scientific Research (TNO). The process features an intense mutual learning between the two organisations, a wider circle of RTOs and stakeholders.

Intention and structure of this report

As a formal Deliverable of the JERRI project and part of work package 2, the present report D2.2 Description of specified RRI goals at Fraunhofer describes the ambitions related to RRI that the Fraunhofer-Gesellschaft and its stakeholders developed in the project. The deliverable is the counterpart of D3.2 in which TNO specifies its goals for RRI. Section 2 outlines the goal development process. Section 3 contains a comprehensive documentation of informal and formal, long-term and short-term goals at Fraunhofer. Conclusions are drawn in section 4.

Methodology

The development of these goals took mainly place in five workshops related to five key dimensions of RRI – Ethics, (Public/Societal) Engagement, Open Access, Gender Equality and Science Education. The goal development process included (1) the identification of stakeholders to be invited to the five goal development workshops, (2) the conduct of the workshops, (3) the reflection of the workshop results together with the JERRI Advisory Board and (4) decisions on concrete RRI pilot activities.

Results

Results of the goal development process comprise several informal visions and long-term goals related to the RRI key dimensions. Based on these long-term perspectives, concrete pilot activities to engage in within the JERRI project are outlined as well. Results hence form the starting point to engage in a further institutionalisation of RRI at Fraunhofer, which will be specified in transformative action plans in the next stage of the project. For doing so, commonalities between the visions, goals and pilot activities also show the overlaps and synergies between the topics and indicate cross-cutting fields of action.

DELIVERABLE REPORT

1 Introduction

It seems obvious that all processes to institutionalise responsible practices in research and innovation should already live up to the central virtues present in the responsible research and innovation (rri)-discourse: participation and responsiveness to the needs of society and wider stakeholder systems. Instead of defining the goals for systematizing the development of the Fraunhofer-Gesellschaft (in the following termed 'Fraunhofer') towards rri before the project's start, these goals were therefore developed in five stakeholder-based workshops as part of Work Package 2. Thematically, the workshops were geared towards five of the RRI key dimensions – Ethics, (Public / Societal) Engagement, Open Access, Gender Equality and Science Education (European Commission 2014, p. 2). This report documents the results of these goal development processes which were based on the goal development concept outlined in Deliverable D2.1 'Fraunhofer concept on organisational RRI goal development'.

The challenge of engaging in these goal development processes was twofold: First, despite the organisation Fraunhofer was always the reference point, goal development processes had to transcend organisational boundaries by involving external stakeholders. As a hybrid form between organisational (here in terms of the object) and system-wide (here in terms of the involved subjects) visioning and goal development formats, the process could not only be based on standardised stakeholder approaches and methods but also had to be adjusted to meet the specific requirements. Second, the ambitions to be developed had to address the fact that organisational change is a long-term endeavour and that the (pilot) activities have to be carried out within the relatively short project period of JERRI but have to support the envisaged organisational change at their best. This implies to take concrete short-term decisions but also to set out less formalized, ambitious long-term visions and goals. The latter should provide a sound basis for further specification¹ and uptake of responsible research and innovation practices in a transformative process that reaches well beyond the project.

¹ This is foreseen in work package 4.



In this report, we speak of ‘RRI-related’ or ‘key dimension-related’ ambitions and activities as the official definition and five key dimensions of RRI² (European Commission 2014, p. 2) structure the goal setting process, but organisation-specific foci and courses fitting the individual situation of Fraunhofer are set within this overall structure. Moreover, ambitions and activities can often be attributed to several RRI key dimensions and are interwoven at the level of the involved and affected stakeholders.

This report is structured as follows: Section 2 outlines the goal development process to equip the reader with a basic understanding of how these ambitions came about³. In section 3, the developed RRI-related visions and goals at Fraunhofer and their reflection in light of the feedback from the JERRI Advisory Board are documented. The resulting pilot activities foreseen for work package 6 are described. Commonalities and links between the visions and goals across the different RRI key dimensions are synthesized, and an outlook on coming activities is provided. Final conclusions are drawn in section 4.

2 Goal development process

The outline of the goal development process presented in this report aims at providing a basic understanding for the reader of how the RRI-related ambitions at Fraunhofer were developed. A more profound description of the goal development concept and an in-depth reflection of the actual goal development process can be found in Deliverables D2.1 and D10.2.

2.1 Process overview

At the process level, the goal development in each of the five areas related to the RRI key dimensions relied on a stringent sequence of steps outlined in Figure 1. Based on the goal development concept, the stakeholders related to the key dimensions were identified and selected to be invited to one (or several) of the five goal development workshops. After gathering the feedback of the Advisory Board on the workshop

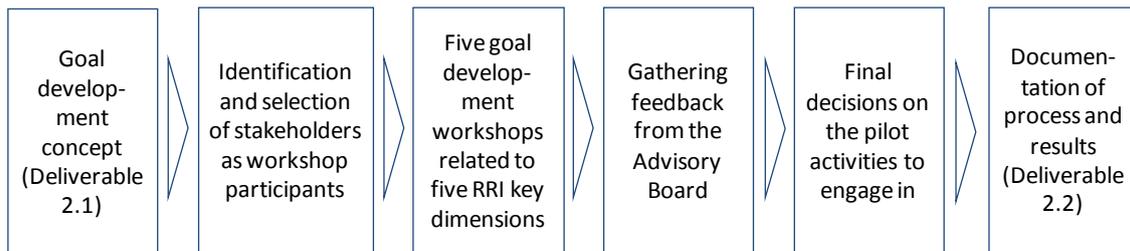
2 Randles 2017 contrasts this official concept and de-facto responsible research and innovation (rri, in lower case).

3 More detailed information on the goal development concept and on the actual goal development process can be found in Deliverables D2.1 Fraunhofer concept on organisational RRI goal development and D10.2 Lessons learned for goal development.



outcomes (informal visions, long-term goals, ideas for pilot activities), decisions on the pilot activities to be carried out were taken within the JERRI project team.

Figure 1: Goal development process at Fraunhofer



2.2 Stakeholder identification and selection

As set out in Deliverable D2.1, the stakeholder identification relied on individual and group brainstorming of the Fraunhofer ISI project staff and the Fraunhofer partners responsible for the respective pilot activities related to the key dimensions in work package 6. It aimed at finding concrete persons representing different stakeholder groups (e. g. ‘institute directors’, ‘authors’, ‘universities’, ‘CSOs’, etc.) internal and external to Fraunhofer that were involved in and/or affected by Fraunhofer’s practices in each of the five RRI-related topics. Out of the entirety of persons, a further selection of stakeholder groups and individual stakeholders to be invited to each workshop was made⁴. For stakeholder groups where none of the invited persons was available, additional persons were identified and invited. In many cases, reminders were sent and the invited were called by phone by Fraunhofer ISI where appropriate.

In all of the five workshops, Fraunhofer staff from both the Fraunhofer Headquarters and several institutes as well as from different functions, levels of hierarchy and sex participated in the five workshops. Except for the workshop on Ethics⁵, members of several external stakeholder groups participated as well. In the invitation (by email) and in the form of a one-page description, participants were briefed about their role, in particular by highlighting the importance of their individual opinion. Table 1 shows the number of participants:

⁴ On the stakeholder types and selection criteria cf. Deliverables D2.1, p. 8 and D10.2 (forthcoming).

⁵ External stakeholder views were brought in by Fraunhofer ISI as a result of two interviews with representatives of Fraunhofer research partners.



Table 1: Number of participants in the five Fraunhofer goal development workshops

<i>Workshop on...</i>	<i>Number of participants</i>	<i>Thereof external stakeholders</i>
...Ethics	14	none
...Science Education	7	1
...Open Access	14	2
...Societal Engagement	13	4
...Gender	15	4

2.3 Workshop procedures

The workshops were moderated by Fraunhofer ISI and took place at different locations, i. e. in the city or at the place where the respective Fraunhofer partners responsible for the implementation of the pilot activities are located. Each workshop was carried out as a one-day workshop and held in German. It was possible to apply all three methodological workshop components as set out in the goal development concept:

- 1) the visioning method to set out the highest long-term aspirations of the stakeholders as regards to the directions into which Fraunhofer should develop in the respective RRI-related workshop topic (in individual work, group work and in plenary discussions).
- 2) the deduction of long-term organisational goals to concretise the visions as informal propositions/orientations to act for Fraunhofer as a whole (in group work)
- 3) the deduction of short-term goals in the form of ideas for pilot activities within JERRI (in the plenary)

In the field of Open Access, a Fraunhofer-wide survey on research data management was carried out by Fraunhofer IRB in addition (cf. sections 2.4, 3.2.3.6, Annex), so that the deduction/selection of pilot activities partly relied on this survey's results as well. In the field of Science Education, another approach was chosen: As the field of Science Education is still framed very weakly at Fraunhofer, steps 2 and 3 were replaced in this workshop by a collection of topics for a deeper learning and mutual exchange in the further course of JERRI. This exchange is considered as necessary to acquire the



relevant knowledge to develop the field for Fraunhofer and to engage in systematic activities going beyond the status quo in the future.

Results of each of step are depicted in chapter 3.

2.4 Survey on open access and research data management

Between 7 March and 22 March 2017, an online survey on open access and research data management at Fraunhofer was carried out by Fraunhofer IRB. The survey aimed at gathering extended knowledge on the state of the art practices and needs on research data management within the Fraunhofer institutes. Results were fed into the elaboration of concrete pilot activities, especially the set-up and test of the open data infrastructure ‘Fraunhofer FORDATIS’.

Target groups were researchers, the so-called ‘FIMs’ (science information managers) and responsible IT managers. As set out in Deliverable 2.1, the responsible IT managers (125 persons) were addressed directly. The invitations for the science information managers were disseminated by email by two directors of Fraunhofer institutes via mailing lists. For this target group, the mailing list of the so-called “Wissenschaftlich-Technischer Rat” (Scientific and Technical Council, 30 persons) was used with a request to redistribute the survey among the researchers. For the target group of the researchers, an English version of the survey was provided as well. No numbers are available on how many researchers were actually reached and hence on the response rate. In absolute terms, 166 researchers responded to all or at least some of the questions. As this target group is considered to be particularly relevant for the identification of the JERRI pilot activities, results of the researcher’s answers are provided in full detail in the Annex. The presentation of the results is divided into the sub-chapters ‘creation of research data’, ‘research data during project phase’ and ‘research data at the end of the project’. Results include selected/summarized free text responses on the open questions as well. The answers for the other target groups can be obtained from Fraunhofer IRB. A link between person and survey results is not possible as the data was gathered anonymously.

2.5 Gathering of feedback from the Advisory Board

All workshop results were presented to/discussed with the Advisory Board at the first JERRI Advisory Board meeting in The Hague on 10 May 2017. Discussions with the



members of the Advisory Board meeting were deepened in bilateral phone calls with the responsible persons for carrying out the (pilot) activities related to the key-dimensions in work packages 6 and 7 at Fraunhofer and TNO. Subsequently, each member of the Advisory Board provided her/his feedback on the Fraunhofer and TNO goals in a written form (cf. chapter 3 of this report and Deliverable D3.2).

2.6 Selection process for the pilot activities

Out of the ideas for pilot activities gathered from the stakeholders, specific ideas were selected to be realised (sometimes in a modified form) following each workshop. The selection was made by Fraunhofer ISI together with the respective Fraunhofer institutes/persons responsible for the activities in each field. The selection was made according to the following criteria:

- the probable effect(s) of the pilot activity in relation to the required effort
- the newness of the activity for Fraunhofer
- the mandate or permission of the person(s) responsible to act accordingly
- the availability of the necessary know-how
- the feasibility of the activity within the time frame of the JERRI project
- the overall budget attributed to the focal Fraunhofer partner/key dimension
- the discussions with/the feedback from the JERRI Advisory Board

It is considered to be necessary to start with some of the pilot activities already now, i. e. before the development of action plans in work package 4, as some require more than 12 months to be effectively carried out. However, all pilot activities will be reviewed and, if necessary, adjusted on the basis of these action plans (cf. section 2.7 below).

2.7 Outlook on coming activities

By already specifying all pilot activities in the form of concrete project outlines, the work that has been done so far somewhat partly anticipated what had been foreseen for the development of transformative action plans in work package 4. As these action plans, which can take on the form of roadmap visualisations, will yet refer to a longer time horizon, the results of the goal development processes provide a suitable starting point: The pilot activities will have to be widened and institutionalised, and further actions will



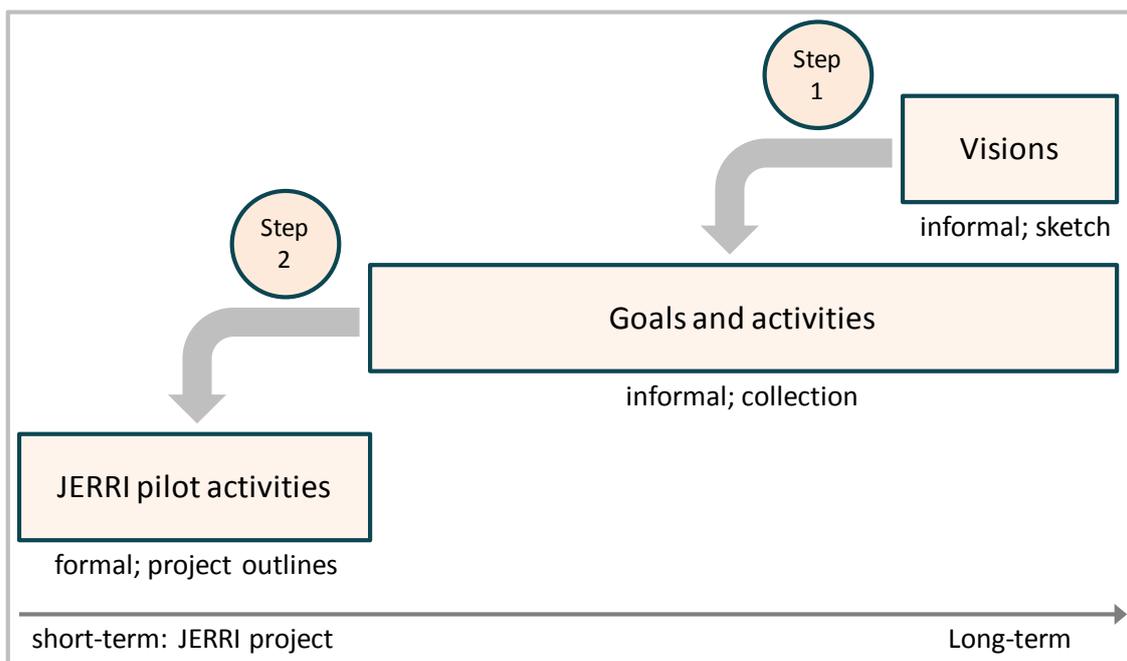
have to be identified that are suited to reach the visions and long-term goals ('backcasting'). In this sense, transformative action plans, whether they are specific to key dimensions or overarching, will concretise the long-term goals and actions that have been formulated so far. The action plans will be developed in stakeholder-based workshops again and will be the counterpart of a parallel action plan development at TNO. In preparation of these workshops, an analysis of organisational barriers and how they can be overcome will be part of work package 4.

3 RRI-related goals at Fraunhofer

3.1 Overview

The ambitions of Fraunhofer developed in work package 2 for each key dimension / field consist of an outline of an informal long-term vision, a collection of long-term goals and activities suited to reach the vision and short-term project descriptions for pilot activities that were decided upon on this basis (Figure 2). As the field of Science Education seems to be in a very early stage of development in many respects, topics for a mutual learning process within Fraunhofer and with external stakeholders were identified instead of developing long-term goals/activities and pilot activities.

Figure 2: Characterization of the RRI-related ambitions at Fraunhofer developed in JERRI





For each key dimension/field, section 3.2 is structured accordingly: First, a short introduction into the general concept (e. g. ‘gender’) in the literature and how it is understood at Fraunhofer⁶ is provided. This introduction is followed by a delineation of the most important/desirable basic aspects from the perspective of the stakeholders involved in the visioning and goal development process. The stakeholder visions themselves are then presented in their original raw versions. Long-term goals and actions as well as the ideas for the pilot activities to be carried out in the JERRI project/work package 6 are described subsequently. The next subsection is dedicated to the external feedback/comments of the respective experts from the JERRI Advisory Board and to the implications for the developed ambitions. Finally, the pilot activities/projects selected by the project members (the person[s] responsible to carry out the respective pilot project[s] within Fraunhofer, and Fraunhofer ISI) are characterised.

3.2 Visions, goals and pilot ideas per field

3.2.1 Ethics

The complex concept of research ethics cannot only be regarded as an RRI key dimension but also as an overarching concept of which the responsibility concept is part (Teufel et al. 2016). One of the main challenges of organisational goal development was thus to find a common and pragmatic understanding of ‘Ethics at Fraunhofer’ that fits the specific structures of Fraunhofer as well as the individual perceptions of the present stakeholders. Thereby, the absence of a broad discourse as well as a rather low level of deliberate and systematic institutionalisation of Ethics at Fraunhofer did not impede stakeholders from agreeing on a common perspective.

3.2.1.1 Conceptual starting point

The initial understanding of ethics underlying existing activities at Fraunhofer as well as the goal development workshop at Fraunhofer was that ethics as a discipline – in line with the classical understanding by Kant – should provide answers to the question: ‘What should I do?’ (Kant 1974b, p. 677). According to this understanding, the function or intention of ethics or ethical deliberation/reflexion is to give the subject a normative

⁶ cf. Deliverable D1.1 Synthesis on existing good RRI practices written by Teufel et al. 2016.



orientation for its practical actions, power of judgement as regards normative value conflicts and also to make its own value settings reflective and underpin decisions with rational arguments (Grunwald 2013, p. 3). In the context of technological research, as practiced by Fraunhofer, this translates into questions such as whether specific technologies are safe enough, whether they are used ‘well’ or whether they are used in the ‘right way’ etc.

Although the initial understanding of ethics at Fraunhofer and the workshop were very close to the definition of Kant as a normatively founded perspective of practical actions (defined by the question: ‘What should I normatively do?’), the actual answer to this question is guided by other maxims than the Kantian one: While Kant is an exponent of deontological ethics stating that there are certain things (e. g. lying) (Kant 1974a, p. 13) that are immoral in itself and therefore normatively forbidden, the ethical principle/tradition emphasised by the RRI construct (and also more in line with an applied research organisation like Fraunhofer) is a consequential and impact oriented ethics tradition which is more in line with an utilitarian tradition (Schöne-Seifert 2007, p. 30). Contrary to Kant’s ethical maxim, which states that there is a duty to do certain things or not to do in itself, a consequential or utilitarian viewpoint that answers the question of ‘what to do?’ from a normative point of view depends on the following results of this action related to others like society as a whole or specific social groups. Our initial understanding of ethics thus fits in the general intention of RRI, which is to set research activity into a stronger connection or in a more responsible relation to the values and demands of society (Lindner, Kuhlmann 2016).

Besides the question what the fundamental perspective/question and principle of ethics at Fraunhofer is, considering in which respect the R&I practices affect social norms and values at all and therefore raise ethical questions is crucial as well. Related to that question, our (initial) understanding – adopted from Grunwald – is that ethical questions could arise during research work in four ‘fields’ (Grunwald 2013, p. 4):

- 1) ethical questions regarding the goals/the (intended) results,
- 2) the applied methods and means employed in the research process,
- 3) the following consequences in relation to affected people/society at large after research results are applied,
- 4) the involved persons, research organisation and nation states



In all four of the listed ‘fields’, moral and normative conflicts during the research process and between the involved parties can occur, and therefore organisations and also scientists who are ethically enabled can deal with these situations in a better way.

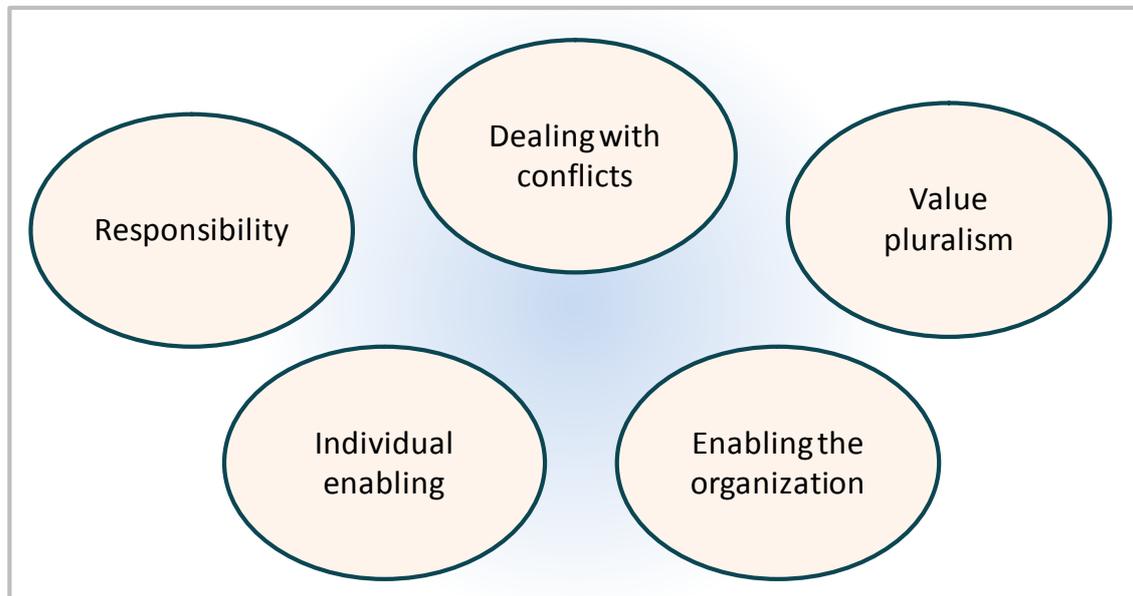
Another fundamental point of ethical considerations inside research organisations is to check, to which extent a normative perspective and an ethical judgement are binding to the organisation. Related to this point, the common position of Fraunhofer is that ethics has mainly the function to make researchers sensitive and self-reflective to social needs and values and also to their own normative disposition. Instead of saying ‘Do this and don’t do this’, ethics at Fraunhofer is rather understood as showing up, thinking about and finally realizing alternatives that are widely in line with societal norms and demands (Reimoser 2016, p. 13). As soon as do’s and don’ts can be generalized, they are no longer regarded as ethical themes but rather included in the behaviour rules (Fraunhofer code-of-conduct) or specified in directives and therefore part of the compliance management system.

3.2.1.2 Important aspects agreed on by the present stakeholders

Based on the conceptual starting point presented by the moderators, the participating stakeholder’s individual view of which aspects they consider as being particularly important when discussing ‘Ethics at Fraunhofer’ was gathered. As shown in Figure 3, important aspects are responsibility (‘Who for whom related to what?’), enabling the organisation related to its roles, structures and processes, and enabling its individuals in terms of their required knowledge and competences. Further important aspects raised were how Fraunhofer copes with value pluralism within the organisation and in society at large and the way various conflicts, such as dilemmas or different values and rights of the Fraunhofer staff, are dealt with.



Figure 3: Important aspects of 'Ethics at Fraunhofer'



3.2.1.3 Long-term vision 'Ethics at Fraunhofer'

The following textbox shows the developed informal vision 'Ethics at Fraunhofer' in its original (translated) wording:



General ambition:

Fraunhofer takes on a leading role in the ethical discourse of the applied sciences. It is being consulted for ethical issues in Fraunhofer-dominated strategic fields as it actively deals with the respective ethical challenges.

Ethics contributes to the creation of identity at Fraunhofer. Enabling the organisation has to be the starting point.

– **Responsibility:**

- Besides technological developments, Fraunhofer addresses societal, ecological and economical implications (“thinking mid- and long-term”).
- Fraunhofer integrates and lives up to ethical responsibility.
- Fraunhofer carries out research projects with a long term perspective and takes on responsibility towards its customers and society as a whole. This responsibility is borne by both project members and executives.

– **Enabling:**

- Fraunhofer staff is enabled (in terms of ‘competence’) to live up to ‘ethics’.

– **Value pluralism:**

- Fraunhofer creates and supports an open, constructive and respectful culture of dealing with conflicts, e.g. via clearing agents, consultancy services, etc.

– **Dealing with conflicts:**

- Fraunhofer actively deals with different moral concepts.

3.2.1.4 Long-term goals and actions ‘Ethics at Fraunhofer’

To discuss the long-term goals that were derived from the presented vision, three major governance principles/fields of action were identified: (1) resources to support



individual capabilities, (2) modularity, flexibility and subsidiarity, and (3) internal entrepreneurs and moderators.

Resources to support individual capabilities

To engage in an organisation-wide transformation for achieving the long-term aspirations delineated in the vision, resources and individual capabilities were considered as being crucial at both the institute level and the level of the organisation as a whole. In particular, the institutionalisation of competent contact persons at different levels is regarded as a necessary step. The most appropriate way of such an institutionalisation at the institute level is seen in the widening of existing functions, e. g. 'ethics functions' in addition to existing scientific integrity functions, or 'ethics' as work packages in projects. At the level of the whole organisation, desirable components are an ethics network between and trainings for these contact persons. Competence building for all Fraunhofer researchers should be fostered via integrating ethical considerations in the internal research programmes.

Modularity, flexibility and subsidiarity

The principles of modularity, flexibility and subsidiarity were all attributed to the question: 'What are the right levels [for achieving the vision] within the organisation?' The executive board is considered as the 'right' actor for providing the necessary impetus for other levels to act. According to the field specifics in research ethics, stakeholders also advocated the pooling of competences/actions according to particularly relevant research fields. Fraunhofer groups would therefore be a suitable level to deal with questions related to different applied ethics. Beyond their existing responsibilities in research ethics, the institutes as well as the single researchers should engage in a deeper knowledge exchange and awareness raising on ethical issues, e. g. via (centrally coordinated) workshops per institute, and on peer-to-peer based modes of exchange.

Internal entrepreneurs and moderators

Beyond mere structural changes, the importance of particular individuals taking on entrepreneurial roles (e. g. acting as role models and thereby motivating others), moderating roles (e. g. clearing agents) and consulting roles (e. g. data protection officer) was highlighted. According to the stakeholders, executive levels such as



directors, the Fraunhofer groups and line managers as well as all actors engaged in external and internal communication should be enabled accordingly in order to allow the organisation to live up to 'ethics'.

3.2.1.5 Ideas for pilot activities

Ideas for pilot activities to already engage in the JERRI project are shown in Figure 4. One major pilot idea that had been brought up earlier by the JERRI project team at Fraunhofer is to test the viability of an ethical screening of project proposals within the internal research programmes in order to consult future applicants on ethical issues related to their proposals. This idea was brought up at the workshop again. Further ideas of tying in with existing structures are to engage into field specific ethics workshops at the annually held Fraunhofer networking symposium 'Netzwerk', or to test the integration of a new ethics module in the qualification programme 'Forschungsmanager/in' based on different case examples. This would include defining what the most important qualification elements are, according to the specifics of the different research fields at Fraunhofer.

Figure 4: Ideas for pilot activities in the field of 'Ethics at Fraunhofer' (selection)





Moreover, participants also brought up the suggestions of a deeper analysis of needs and offers 'on the market', the acquisition of external expertise, e. g. via presentations of university professors, and the set up of a best practice catalogue for ethics at Fraunhofer. Another idea which could be easily widened beyond a mere pilot activity is to engage in a wider discourse on one selected topic with strong ethical implications. Furthermore, working together with the members of the executive development programme 'Vintage Class' is considered to be a possible option to promote ethical deliberation at Fraunhofer.

With regards to all pilot activities, it was emphasised that they could be targeted to the thematic fields of the different Fraunhofer groups that the needs and expectations of the Fraunhofer staff should be analysed, e. g. in a survey, and that the resources dedicated to these activities should be used in a very efficient way.

3.2.1.6 Comments of the Advisory Board and their implications

The JERRI Advisory Board appreciates that the developed Fraunhofer ambitions in the field of ethics focuses on personal responsibility, integrity and capacity building. As ethical issues vary from field to field, it highlights the importance of tailoring down the approach to address the specifics of the different research and innovation fields. Capacity building in this context is especially required for deliberation and decision making in newly emerging technology fields.

Considering the developed long-term goals, ethics as an aspect of scientific integrity is particularly highlighted. In the long term, the allocation of human resources to deal with the ethics dimension should be advocated. Moreover, an internal incentive system should be taken into account, e. g. an internal reward system for employees that would acknowledge the efforts made by them in the field of rri (and hence in the field of ethics).

In sum, the ideas for the pilot activities are valued as reflecting a comprehensive approach. Because of the same reason, the prioritization of the pilot activities is considered to be necessary. No matter which pilots will be selected first, it is recommended to gear them towards a particular topic/research/application field researchers are familiar with. On this topic, a debate should be initiated to elaborate the relevant questions, to identify the required skills and to set up a searchable database of external experts that can help in finding solutions. This would also help to establish a screening process for the internal research programmes.

3.2.1.7 Characterization of the “Ethics” pilot activities

Based on the Advisory Board recommendations and on the further criteria set out in section 2.6, the following pilot projects to be carried out by the headquarters and Fraunhofer ISI were selected:

- **Ethical screening and consultancy for project proposals in the internal research programmes**
- **Multiplying orientational knowledge on research ethics in the research management qualification programme ‘Forschungsmanager/in’**
- **Set-up and test of a discussion format on one particularly relevant application field**

Being subject to further internal discussions, further pilot projects may optionally be launched in addition. This would possibly reduce the scope of the above-mentioned pilot projects but not endanger their feasibility or quality.

Pilot project ‘Ethical screening and consultancy for project proposals in the internal research programmes’

Project duration: 02/2017 – 12/2018 (already partially started)

Effort: 12 person months

Expected long-term impact: Building up individual capabilities of Fraunhofer researchers for ethical considerations in research projects on a wide scale

Activities:

The ethical screening and consultancy for project proposals in the internal research programmes MAVO, WISA and ‘Leitprojekte’ (Lighthouse Projects) should make applicants reflect on the ethical dimension of the proposed research projects in terms of their goals, methods, consequences and actors involved. By means of a guideline/guiding question, designated ethics reviewers will be enabled to screen the project proposals on ethically relevant aspects, and subsequently consult applicants on these aspects. To increase the researchers’ receptiveness for ethical considerations, the ethical dimension will not constitute a formal evaluation/selection criteria for the project proposals; instead, it will be reflected in a mutual exchange between reviewers and applicants. First, a conceptual framework based on the literature on (applied) research ethics will be developed and transformed into an ethical screening guideline.



Second, appropriate modes/settings for an ethical screening, including the guideline, will be tested and iteratively developed.

Pilot project ‘Multiplying orientational knowledge on research ethics in the research management qualification programme “Forschungsmanager/in”

Project duration: 09/2017 – 03/2019 (already started)

Effort: 5-6 person months

Expected long-term impact: Enabling research managers as multipliers of ethical considerations

Activities:

Together with the Fraunhofer Academy which organizes the qualification programme “Forschungsmanager/in”, a format to inform on/discuss ethical aspects in one selected, relevant application field at the meetings of the programme’s alumni network will be developed and tested. This network with a growing number of members (currently 62) represents a diverse set of researchers predominantly in middle management functions at the Fraunhofer institutes. The network will be enabled to act as an ethics think tank and to publish recommendations for the research management at Fraunhofer. The pilot project aims to test the viability of setting up such a think tank and to lay the foundation for its long-term institutionalisation. The development and test of the ethics module within the qualification programme could optionally follow from this activity.

Pilot project ‘Set-up and test of a discussion format on one particularly relevant application field’

Project duration: 04/2018 – 07/2018

Effort: 3-4 person months

Expected long-term impact: Spreading field-specific, organisation-wide ethics discourses by means of a discussion format to be easily replicated/taken up

Activities:

After selecting a pilot application field of both high ethical relevance and high relevance for the Fraunhofer research portfolio, a discussion format/workshop concept will be developed and tested with representatives of the respective research field. This test



includes choosing a suitable, existing platform, e. g. a Fraunhofer group or a sectoral centre of excellence, e. g. the “Profilregion Mobilitätssysteme Karlsruhe”. Based on these experiences, this format will be further developed and promoted for an uptake by further application fields/platforms.

3.2.2 Gender

Probably because of the broad presence of the gender discourse also outside the research organisation (e. g. in the family, mass media, public sphere, ...), the ‘Gender’ topic can be viewed as something ‘everyone [even a non-expert] has already been confronted with’, as one workshop participant stated. In conjunction with the fact that structures and activities to promote gender equality and diversity at Fraunhofer are relatively well developed at least in the research processes (as opposed to research content), the development of an ambitious long-term vision and goals that potentially set themselves clearly apart from the status quo was a challenging task.

3.2.2.1 Conceptual starting point

In the context of RRI, the ‘gender’ dimension aims at overcoming the inequalities connected to the social construct of gender, including the causes of these inequalities (Caprile et al. 2012; Wroblenski et al. 2015, p. 16). In research and innovation, three main areas have been identified where activities can be pursued in order to achieve this goal: (1) the equal representation of women and men in all disciplines and at all hierarchical levels, (2) the structural conditions which can be barriers for women to reach specific positions or career paths and (3) the consideration of gender aspects in the research and innovation content.

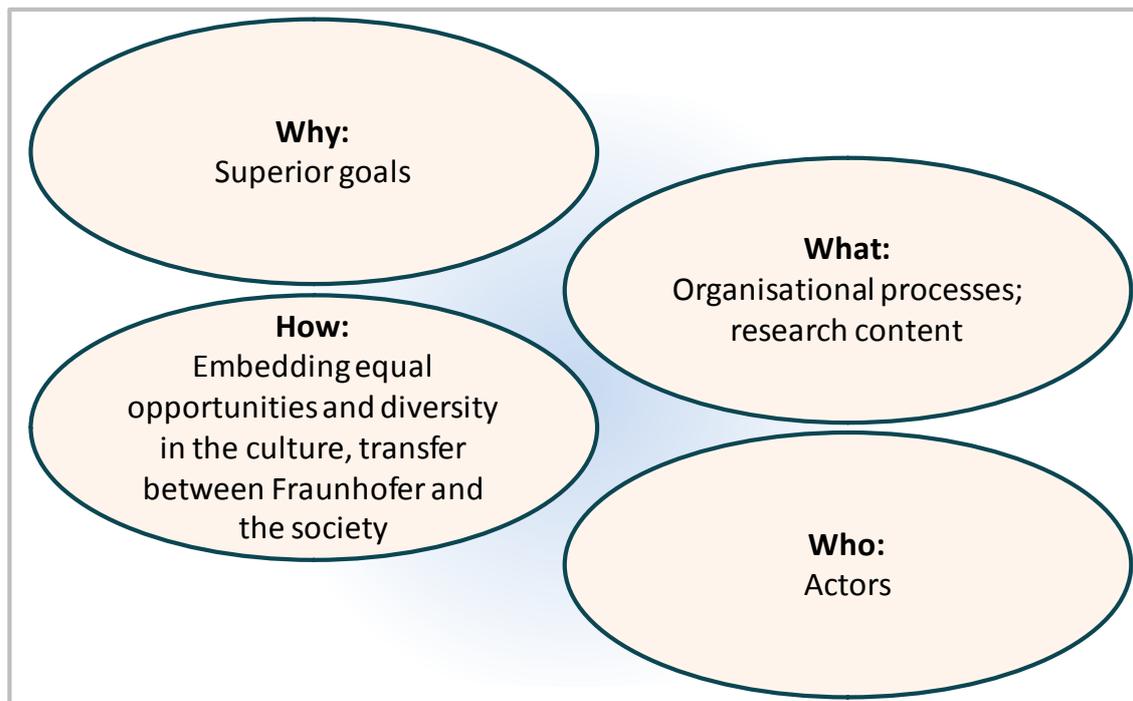
At Fraunhofer, ‘gender’ is mainly understood today as either ‘gender equality’ or ‘as one of the several dimensions of diversity among the Fraunhofer staff’ (Teufel et al. 2016, p. 22). With this specific but at the same time broad understanding, the general framework in which goals for ‘Gender at Fraunhofer’ had to be developed related to aspects of both equality and (gender) diversity, at the level of research and other organisational processes but also at the level of research and innovation content.

3.2.2.2 Important aspects agreed on by the present stakeholders

When developing the long-term vision for ‘Gender at Fraunhofer’, stakeholders decided to focus on four elementary questions: ‘Why’, ‘what’, ‘how’ and ‘who’ (cf. Figure 5). The

question ‘why’ related to the superior goal behind all activities to realize gender equality and diversity, yet without questioning gender equality and diversity at all. The general objects or levels (‘what’) of the desired future were decided to be both gender organisational processes and gender in research content. Another important element of the vision was defined as the ways (‘how’) in which equal opportunities and diversity are to be embedded in the culture and the transfer of knowledge, practices, requirements etc. between the organisation and the society. In this sense, culture refers to both the organisation and its interaction with the public. The last question was about the actors (‘who’) involved in/affected by different related practices.

Figure 5: Important aspects of ‘Gender at Fraunhofer’



3.2.2.3 Long-term vision ‘Gender at Fraunhofer’

The following textbox shows the developed informal vision ‘Gender at Fraunhofer’ in its original (translated) wording:



General ambition:

At Fraunhofer, equal opportunities of all individuals independent from their sex are realized and self-evident. Everyone has equal opportunities. The gender bias is removed.

- **Why:**
 - Benefit for society as a whole
 - Higher job satisfaction, higher quality of work and higher overall success for Fraunhofer
- **What:**
 - Realisation of working models that fit different ways of (organising private) life
 - Gender competences exist, also for gender in research content
- **How:**
 - Culture of fairness and respect
- **Who:**
 - Authorised and accepted persons in charge with the necessary qualification
 - Executives
 - ‘You and I’
 - Women, men and all others

3.2.2.4 Long-term goals and actions ‘Gender at Fraunhofer’

To achieve the vision delineated above, participants chose the following governance principles/fields of action as being the most relevant: (1) entrepreneurs/promoters, (2) resources and (3) deliberation and transparency. It is important to note here that the



goals were discussed independently from the fact that some of them are already achieved, at least in part, today.

Entrepreneurs/promoters

As in the field of ethics, single individuals among the Fraunhofer staff who take on specific roles are considered as one major lever to further promote gender equality and diversity at Fraunhofer: First, promoters would be needed as persons in charge who offer support, who know where to find help and who develop the topic further. Such roles can already be found today, e. g. in the form of the equal rights officers. Moreover, various means to qualify large groups of the Fraunhofer personnel, e. g. executives, to promote gender quality and diversity, e. g. equal opportunities in personnel selection, is considered to be important.

Resources

When discussing the required resources, the Fraunhofer personnel was again considered as crucial. More (?) resources should be spent for authorised promoters with acceptance, motivation and qualification, who call others to commit themselves and monitor the success in achieving the desired ambitions. Further required resources emphasized were 'time' in terms of (1) fixed time slots in the meetings of all relevant decision-making bodies and (2) time for trainings. Another type of mentioned resources required to achieve the vision are financial resources in terms of 'negative' incentives for persons in charge, trainings, campaigns/information materials and gender budgeting. The latter refers to the (re-)structuring of budgets towards more gender equality.

Deliberation and transparency

Different qualities of deliberation and transparency on gender-related issues should not be left to chance but be further understood, reflected and shaped in the gender debate at Fraunhofer and beyond. For example, one important question is whether 'gender' with its different connotations is always the best term to pursue gender equality and diversity and whether there are more suitable, alternative terms. The related psychological factors should also be better understood. The gender debate should be fed with facts, the organised communication of the topic should be specific to target groups, e. g. age-specific, and make everyone accountable. Constructive gender

debates would require a further transfer of gender competences and a systematic development of the motivation to deal with the topic.

3.2.2.5 Ideas for pilot activities

The long-term perspective that was taken on when discussing these goals was used again to engage in a brainstorming of pilot activities that could potentially be carried out already in the JERRI project (Figure 6). One idea that previously existed in the project team, namely the further development of the existing Gender Diversity Toolbox showing various best practices for the realization of equal opportunities (cf. chapter 3.2.2.7), was brought up again.

Figure 6: Ideas for pilot activities in the field of 'Gender at Fraunhofer'





To provide all actors with good or best practices, the ideas of identifying and presenting individual role models and of engaging in a virtual simulation and communication of the ‘ideal’ institute for equal opportunities were brought up. To build up the required competences on a broader basis, further ideas were mentioned: the development and test of a career seminar for women, using a ‘serious play’ approach, and a collection of frequently asked questions for different individual situations of the Fraunhofer staff, e. g. for the reconciliation of work and family life. Moreover, testing the viability of fireside chats of the headquarters with all kinds of employees could lead to more empowerment in terms of information and motivation as well. To change the way actors think of and debate gender-related issues, the participants thought of developing and engaging in a playful/gaming approach to an unconscious bias test provided by the initiative ‘Chefsache’⁷. Another idea – namely the collection of ‘worst practices’ to show up needs for action and a pilot activity to ‘break up’ male executives’ arguments against home office models – points into a similar direction. The realization of flexible working models, including maternal/paternal leaves, could be further supported by resorting to external job sharing platforms in a more systematic way.

3.2.2.6 Comments of the Advisory Board and their implications

The Advisory Board provided a collection of existing readings of and empirical experiences with the institutionalisation of gender equality, particularly references to existing GEPs (Gender Equality [Action] Plans) from other H2020 projects on which the development of a long-term roadmap within the JERRI project may build.

Two pilot ideas were explicitly appreciated in the discussion with the Advisory Board: The further development of the existing Gender Diversity Toolbox and a pilot on the genderization of disciplines and scientific research (‘gender in research content’). Thereby, the first pilot activity, the Gender Diversity Toolbox, was further specified, with the following recommendations:

Concerning the toolbox, it would probably be wise to work first on accessibility in order to strengthen the measure, as it was judged to have the great quality of allowing overcoming bureaucratic structures of the organisation. Here, it would be very likely that a new domain could provide a more adequate positioning within the JERRI project as the current one is still linked to the previous project STAGES and it requires registering in order to access the webpage www.stages-online.info. The Advisory

⁷ <https://initiative-chefsache.de/handlungsbedarf/chefsache-test/>



Board also advised to get rid of the requirement of the registration process as it might discourage less committed users from proceeding.

It frequently happens that non-experts do not find the time to read documents or, even if they do, are not able to grasp at a first glance how they could be using such documents in their daily activity. It would hence be also interesting to match the development and implementation of the toolbox with the organisation of seminars dedicated – through the process of storytelling – to make best practices available in a better way.

Also stimulating could be the idea of widening the scope of the toolbox through opening the toolbox to other organisations – not only to Fraunhofer – and promoting internationalisation. To do so, all best practices included should be made available in both German and English. Moreover, the categories of the toolbox (Gender-aware organisational culture; Work-life balance; Career support for women; Recruiting young talent; Gender-aware research; Visibility of women and science) could be maintained as they are, but they could be enriched during the project.

3.2.2.7 Characterization of the ‘Gender’ pilot activities

Based on the Advisory Board recommendations and on the further criteria set out in section 2.6, the following pilot projects to be carried out by Fraunhofer IAO were selected:

- **‘Gender Diversity Toolbox’**: further development, opening up and internationalization of the existing Gender Diversity Toolbox
- **‘Role models at Fraunhofer’**: the identification and public communication of role models by means of integration into the Gender Diversity Toolbox and by designing an electronic booklet
- **‘Gender in research content consciousness’**: identification and (further) development of existing checklists, identification and communication of related case examples by means of integration into the Gender Diversity Toolbox

Being subject to further internal discussion, further pilot projects may optionally be launched in addition. This would reduce the scope of the above-mentioned pilot projects but not endanger their feasibility or quality.

Pilot project ‘Gender Diversity Toolbox’



Project duration: 04/2017 – 04/2019 (already started)

Effort: 10 person months

Expected long-term impact: Permanent provision of orientational knowledge on how to best deal with gender-related issues in different, concrete situations; directly accessible for other RTOs

Activities:

Under a new publicly accessible domain⁸, and with a site relaunch, the web presentation of the existing toolbox containing best practices on gender issues will be updated. The existing entries will be reworked with the agreement of all authors. An English version will be set up as well. Marketing activities to increase the publicity at other RTOs will be conceptualized and carried out. New best practices/entries will be acquired and included. This will also include 'role models' as well as checklists and case examples on gender issues in research content (see below).

Pilot project “Role models” at Fraunhofer

Project duration: 07/2017 – 04/2019

Effort: 7 person months

Expected long-term impact: Motivation and enabling of all actors affected to live up to gender equality and diversity

Activities:

'Role models' for gender-related issues will be targeted both to Fraunhofer staff and to external target groups, especially other RTOs. These role models (women, men, others; selected from the Fraunhofer staff and external ones) will be presented via the Gender Diversity Toolbox as well.

For Fraunhofer internal target groups, an electronic booklet with three to five role models on different topics, e. g. on leadership in part time, job sharing, breaking up arguments against home office models, etc. will be set up. This will include the following activities:

⁸ The domain will probably be 'www.gender-diversity-toolbox.de'.



- Set-up/pre-test of an interview guideline
- Search for role models, e. g. via the Equal Rights Officers. Potential role models need to be convinced to take part in the activity.
- Face-to-face or telephone interviews with the role models and optionally up to two persons in their ‘surrounding’
- Interview analysis
- Writing an appealing text on each role model
- Designing the electronic booklet
- Presenting the role models in the Gender Diversity Toolbox (anonymous)

For the Fraunhofer external target groups, the activities will be similar to the ones described above but involve the following ones in addition:

- Search for ‘role models in other organisations/external to Fraunhofer
- Provision of a form to gather information on/present the role models

Pilot project “Gender in research content consciousness”

Project duration: 07/2017 – 04/2019

Effort: 3 person months

Expected impact: Awareness raising and development of individual capabilities

Activities:

To raise awareness for gender-related issues in research content, existing checklists/guidelines and case examples will be identified and included in the Gender Diversity Toolbox. First, an in-depth search for available and well-tried checklists and guidelines will be carried out. If feasible, the relevance and suitability of the checklists and guidelines for the relevant research and application fields at Fraunhofer may optionally be assessed by experts in the field. The same will be done with case examples relevant for research and innovation at Fraunhofer. The result will be an easy-to-find and coherent collection of material that will be accessible and promoted by the Gender Diversity Toolbox.



3.2.3 Open Access

The development of organisational ambitions in the field of open access cannot be reduced to questions about the adequate technology or infrastructure. To think of a comprehensive, desirable future state, the governance of the whole open access ‘ecosystem’ (Sveinsdottir et al. 2013) should be taken into account. The developed ambitions for ‘Open Access at Fraunhofer’ reflect this wider perspective, e. g. by responding to questions regarding the open access culture, the involved actors or the underlying business models.

3.2.3.1 Conceptual starting point

Although the RRI key dimension Open Access is relatively well-defined, it is important for a proper understanding to know that it is part of the wider concept of open science. The overall goal of open science is to make scientific knowledge as a public good freely available for the public without fees in order to ‘enhance open circulation of knowledge across national borders, including knowledge transfer’ (Meijer et al. 2015, p. 9). Open science can be differentiated according to two major aspects: open access and open data. The first dimension refers to the free availability of research results so that every interested person can take advantage of publicly funded research without paying a fee for access as it was the case in traditional modes of publications (Meijer et al. 2015, p. 19). Open data refers to the public access to the data underlying the research results.

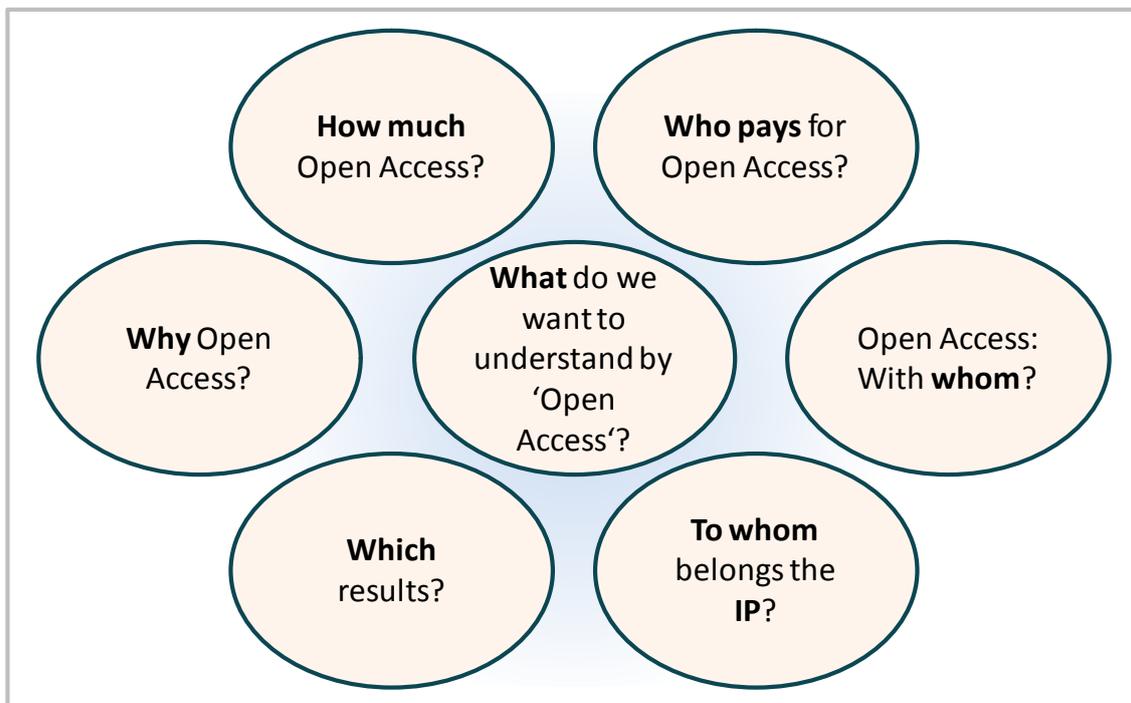
At Fraunhofer, a clear concept of open access is set out in the official Fraunhofer Open Access Strategy stating that ‘open access implies granting free and long-term access to scientific findings and scientific literature.’ (Fraunhofer-Gesellschaft 2015, p. 1). Accordingly, Fraunhofer ‘pursues and promotes the goal of making science and its results more easily accessible to a greater number of people.’ (Fraunhofer-Gesellschaft 2015, p. 1). In terms of the wider notion of open science (European Commission 2016), this does not only include the free availability of publications but also the simultaneous publication of and open access to the underlying research data in specific repositories.

3.2.3.2 Important aspects agreed on by the present stakeholders

Although today’s definition of open access at Fraunhofer is rather clear-cut, the desired future understanding of open access at Fraunhofer is more ambiguous by nature. Accordingly, the question ‘What do we want to understand by “open access”?’ was

considered by the workshop participants to be crucial when developing the long-term vision for ‘Open Access at Fraunhofer’ (cf. Figure 7). Further very basic questions to be answered were about the (future) purpose(s) or superior goals of open access (‘Why Open Access’), and about its extent (‘How much Open Access’). Partly related to this question, stakeholders considered the question about ‘which results’ should be open access as important. Beyond the results as the ‘object’ of Open Access, the involved subjects (‘Open Access: With whom?’) and their roles (‘Who pays for Open Access?’, ‘To whom belongs the IP?’) were to be discussed as well.

Figure 7: Important aspects of ‘Open Access at Fraunhofer’



3.2.3.3 Long-term vision ‘Open Access at Fraunhofer’

The following textbox shows the developed informal vision ‘Open Access at Fraunhofer’ in its original (translated) wording:



General ambition:

Fraunhofer has undergone a fully fledged cultural transformation towards Open Access and now lives up to its social responsibility.

- All data and publications resulting from publicly funded scientific research are treated as commons. Full access is provided to any person wishing to consult them.
- Fraunhofer has put into place an Open Access Platform i.e. data rooms that are open and – where needed – closed, together with the necessary infrastructure components.
- Fraunhofer researchers deal with research data and related industry collaborations in a fair and competent way. Clear rules and licensing models exist. Industry clients are supported to use Open Access business models wherever feasible.
- Fraunhofer researchers are present in Editorial Boards of Open Access Journals.
- Fraunhofer has institutionalised:
 - quality management
 - the protection of intellectual property using a classification
 - personal accounts for different target groups
 - the recording of all research data / possibility to identify research data
 - digital Object Identifiers (DOIs)
 - links between research data and publications
 - interfaces and standards
 - long-time archival storage



3.2.3.4 Long-term goals and actions 'Open Access at Fraunhofer'

When asked about the governance principles/fields of action to engage in a further organisational transformation towards the developed vision, two major thematic clusters were chosen to be elaborated: (1) culture and (2) resources.

Culture

In order to engage in a further organisational transformation towards open access, stakeholders argued against a 'one size fits all' approach: As different disciplines show different histories of more or less successful transitions towards open access⁹, tailor-made strategies should be formulated for each discipline-specific publication culture. These strategies should account for adequate incentives to publish open access. Apart from that, stakeholders see a general need for clear rules to deal with research data, e. g. embargo periods, for their use. Moreover, a convincing open access business case should be set up; a reference was made here to the audio coding format mp3¹⁰. A 'basic' business model could be developed by Fraunhofer researchers by means of the internal research programmes. In conjunction with such a business model, the following questions on industry cooperation should be addressed:

- Can there be an added value for industry?
- How to deal with the research data? What should be allowed?
- How will the data be stored?

Once a business model will be developed, the Fraunhofer institutes should be consulted on specific business cases.

As open access – and particularly: the open access culture – can be considered as a part of science communication, Fraunhofer's open access activities should always be aligned with Fraunhofer's science communication strategy and vice versa.

⁹ These remain yet largely to be analyzed.

¹⁰ <http://www.audioblog.iis.fraunhofer.com/mp3-software-patents-licenses/>



Resources

If Fraunhofer is to live up to the vision outlined above, resources should be made available in three respects: (1) more *personal*, particularly for centralized tasks, (2) required *financial resources* to publish open access should be already anticipated in research project proposals, and (3) where necessary, *hardware* should be upgraded. As another ‘soft’ resource, information, consulting or training of researchers is needed not only to show up the value of open access in a transparent way but also to provide orientational knowledge within the organisation. In this context, decision support tools could enable researchers to take the ‘right’ situational decisions.

On the question where decision-making authorities should be located, stakeholders advocated a balanced combination of a top-down and a bottom-up approach: There should always be a top-down definition of an overall open access strategy via the headquarters. This strategy should be operationalised/realised at the level of the institutes, thereby providing feedback loops to the headquarters, e. g. reporting problems to which solutions have to be found. There should be a common understanding of open access at both levels.

3.2.3.5 Ideas for pilot activities

Based on the long-term perspective delineated above, ideas were collected on which activities could already be carried out in the JERRI project (cf. Figure 8). As for the other key-dimension-related fields, these activities should have a pilot character, i. e. being new to the organisation and suited for a further uptake/diffusion/institutionalization in the organisation. Thereby, one activity that already passed the status of an ‘idea’ was mentioned again: the set-up and test of the open data infrastructure ‘Fraunhofer FORDATIS’, which has already started to some extent. Further ideas for pilot activities can roughly be grouped into activities to identify business models and viable/best practices, activities to provide the required competences, activities for awareness raising and activities to foster the exchange with TNO.

Figure 8: Ideas for pilot activities in the field of ‘Open Access at Fraunhofer’



In line with the long-term goals, the idea of developing a basic open access business model for Fraunhofer already as a pilot activity was brought up. Related to this idea is the development and ‘real test’ of an open access part in model contracts with industry as well as the identification and communication of success stories on specific business cases. To engage in such activities, open access ‘role models’ could be identified and interviewed as ‘entry points’. In addition, an amplified communication of financial ‘anchors’ to publish open access was mentioned. To build up the required competences in the field of data management, trainings could be developed and tested. To provide the required knowledge about the field specificities of open access in different disciplines, a support for publication in gold journals could be set up.



According to the stakeholders, a further cultural change towards a broad appreciation of open access publications could be achieved by integrating open access into Fraunhofer's science indicators. The development and communication of an internal marketing strategy for open access, possibly including an open access road show at all Fraunhofer institutes, could further raise the awareness of the researchers and other involved actors for open access. Moreover, ideas for two pilot activities that are explicitly designed for a mutual learning between Fraunhofer and TNO were mentioned: first, the direct use of the Fraunhofer open data repository FORDATIS by TNO for its own publications (for testing purposes), and second, the test of TNO's decision support tool for publication processes by Fraunhofer researchers.

3.2.3.6 Synopsis of the survey on open access and research data management at Fraunhofer

The views of the stakeholders that were directly involved in the formulation of the 'Open Access' ambitions seem to be widely supported by the results of the survey on open access and research data management at Fraunhofer (cf. section 2.4 and Annex): Researchers store significant amounts of research data, but today storage is very heterogeneous in terms of storage devices, access rights, the provision of metadata, and the definition of processes. Moreover, the degree of knowledge about research data management is very heterogeneous. Taken together, the responses indicate that the whole portfolio of central support services provided by Fraunhofer IRB is often not known. More than 50 % of the respondents stated that they are willing to openly share a part of their research data during projects. To do so, there seems to be a general need for a centralized infrastructure. Moreover, a big share of respondents uses 'external' research data or plans to do so and expects the impact of research data citations for scientific reputations to increase in the future. In sum, there is both a readiness to publish research data and a need for support. This speaks for further activities to develop a centralized open data infrastructure and the provision of a centralized support, e. g. by means of information/consulting and solutions which are standardized to some extent.

3.2.3.7 Comments of the Advisory Board and their implications

The JERRI Advisory Board emphasizes that Fraunhofer has a clear open access policy and institutional support and that a reflective and thoughtful process enabling the organisation to learn about how to best take open access forward, is one of the



defining features of the Fraunhofer approach. From an organisational viewpoint, however, one of the main challenges in this process is Fraunhofer's organisational structure with its large number of institutes, which always holds the risk of fragmentation in the development of open access. Being aware of this challenge, Fraunhofer responds to this challenge with a strong focus on networking between central actors among the Fraunhofer institutes and beyond. A long-term action plan will have to be designed in a way that counteracts this risk of fragmentation, especially when bringing further dynamics into the field of open access for research data.

Moreover, because of the hybrid commercial/public role of an RTO, the adjustment of open access to legal aspects of IP and the recognition of the added values of open access in terms of (1) competitiveness, (2) a public good, and (3) a component of research integrity are highlighted as important aspects of a further transformation. To support the holistic, non-technocratic approach of Fraunhofer, it is recommended to rely on a heuristic of the open access 'ecosystem', e. g. Sveinsdottir et al. (2013, p. 30). These aspects are reflected in the choice and design of the pilot activities (see below).

3.2.3.8 Characterization of the 'Open Access' pilot activities

Based on the Advisory Board recommendations, the survey on open access and research data management at Fraunhofer as well as the criteria set out in section 2.6, the following pilot projects to be carried out by Fraunhofer IRB were selected¹¹:

- **'Setting up and testing the open data infrastructure FORDATIS'**
- **'Development of an open access business model and IP clarification support'**
- **'Development and test of "open paragraphs" in research contracts'**
- **'Development and communication of a marketing-strategy for Open Access at Fraunhofer'**, including the identification of role models (scientists), best practices and an Open Access road show

¹¹ A test of TNO's decision support tool for publication processes by Fraunhofer researchers is planned as well. However, the scope of this activity is rather small so that no dedicated planning or resources are required.



– **Pilot project ‘Setting up and testing the open data infrastructure FORDATIS’**

Project duration: 06/2016 – 06/2018

Effort: 10 person months

Expected impact: Achieving a major transition towards a strong open access culture by expanding the Fraunhofer publication infrastructure towards research data

The ambition of setting up and testing an open data infrastructure already existed before the goal development process in WP 2. First development and testing activities have already been carried out as part of the JERRI project. The necessity and suitability of FORDATIS for Fraunhofer was confirmed in the goal development process. As already set out in the description of work, the FORDATIS project aims to establish a seamlessly integrated open access system for capturing both research data and publications. This open access system is globally unique and could place applied research in Europe at the forefront of research data sharing. Major project activities are:

- development of a system to systematize research data, describe it with standard metadata and address the data sets with persistent identifiers/DOIs (Digital Object Identifiers) including a search function
- harvesting metadata via OAI-PMH (Open Archives Initiative Protocol for Metadata Harvesting)
- development of a workflow for capturing research data within the open access system
- pilot implementation of the system at some institutes
- capturing of lessons learned and developing a rollout plan for the whole Fraunhofer-Gesellschaft
- continuous interaction with internal and external stakeholders to foster cultural transition and mutual learning

Pilot project ‘Development of an open access business model and IP clarification support’

Project duration: 09/2017 – 12/2018

Effort: 6 person months



Expected impact: Advice and services for researchers to make decisions in the way they strategically handle their research output and to make more use of open access

Activities:

The results of the stakeholder workshop revealed a need among scientists for support and enabling services to decide if research results, especially research data or publications (patent relevant information), can be made openly available or not. In many cases researchers do not have the expertise and relevant information about the possibilities of value creation or exploitation of the research output.

Bringing together researchers with experts on open access (publications and research data), IP and business model development within the organisation will help to elaborate use cases that show the potentials and different possibilities of open concepts. With the help of this joint expertise, it will also be figured out in which way useful information and services that support the decision making in this context (in particular on IP-related issues) can be provided, e. g. centrally by Fraunhofer IRB. The effect of providing such business model use cases and decision support is expected to be strong because the results would be made available for all Fraunhofer researchers that generate research data and publications regularly (11.000).

Pilot project ‘Development and test of “open paragraphs” in research contracts’

Project duration: 09/2017 – 12/2018

Effort: 3.5 person months

Expected impact: continuously attract researchers’ attention to the possibility of making research data in/from projects with industry openly available

Activities:

Within the large share of projects for industry, commercial interests of the clients impede the realization of open access in many cases. Complementary to the development of case-based open access business models, a paragraph in existing model contracts with industry that explicitly deals with open access issues, e. g. as part of the IP section, will be developed and tested. This will help researchers to discuss different ways of exploiting research data generated in the projects with their clients, including the possibility of open access.



Pilot project ‘Development and communication of a marketing strategy for Open Access at Fraunhofer’

Project duration: 09/2017 – 12/2018

Effort: 5 person months

Expected impact: Increasing the awareness of various open access possibilities and related central support services at Fraunhofer

Activities:

The stakeholder workshop, the survey on open access and research data and earlier analyses indicate that the whole portfolio of central support services provided by Fraunhofer IRB is often not known among researchers and other actors involved. In order to change that, role models of scientists who apply the principles of open access in their scientific work and who represent these values will be identified. Via interviews, their practical implementation of open access will be analyzed and documented. Based on this analysis and further available sources of information, a comprehensive marketing strategy for open access within Fraunhofer will be developed. Part of this marketing strategy will not only be a communication of these role models and related best practices but also a road show carried out by Fraunhofer IRB at several institutes to raise awareness for/communicate the benefits and best practices of open access.

3.2.4 Societal Engagement

Representing in certain respects the core idea of responsible research and innovation (Sutcliffe 2011, p. 3; Schomberg 2012, p. 50; Lindner, Kuhlmann 2016, p. 22), the concept of Societal Engagement is not easy to grasp. Together with the rather decentralized bottom-up approach of Fraunhofer in its activities related to Societal Engagement, the development of goals had to account for quite different individual understandings. However, the resulting degrees of freedom, together with the long-standing experiences of single institutes and external stakeholders, left room for developing an ambitious vision and collecting ideas on new and experimental approaches to promote the participation of societal actors at Fraunhofer.



3.2.4.1 Conceptual starting point

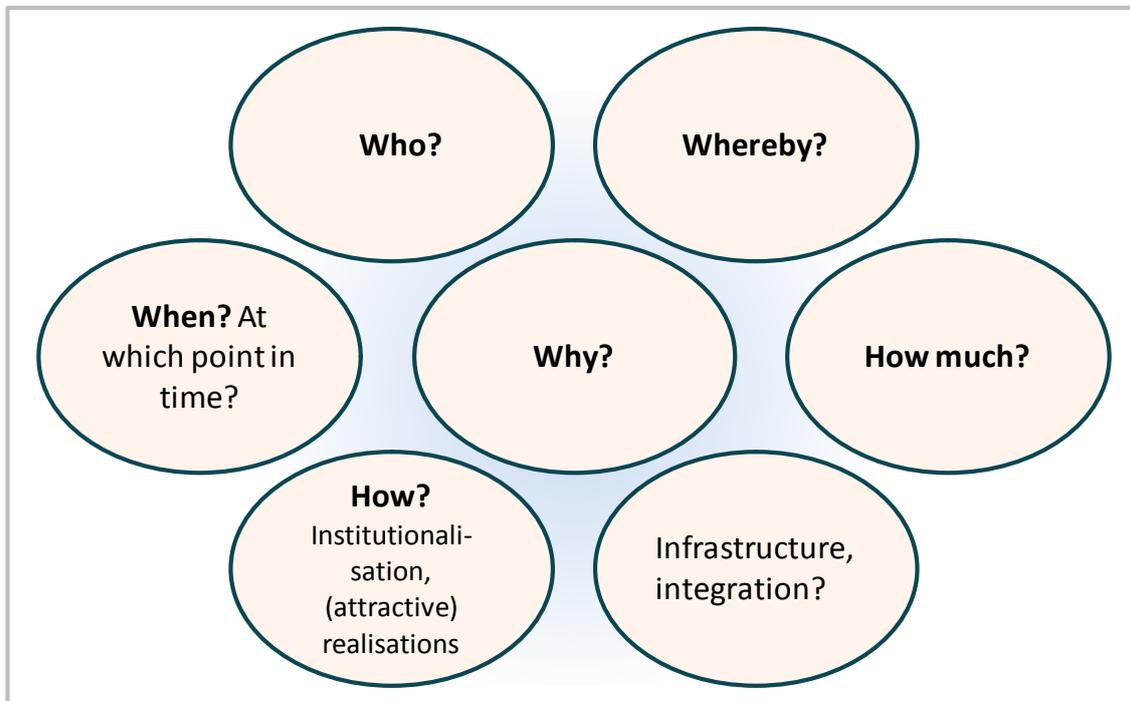
First of all, Societal Engagement/Public Engagement is rather an umbrella term for a variety of diverse and heterogeneous approaches than a clear-cut terminus. It is therefore not surprising that it is hard to find a consensual definition and understanding of the concept (Mejlgaard, Ravn 2015, p. 14). Some classifications can however be helpful for an overview of the varieties of related activities: A much noticed and cited paper from Ravn et al. 2014 (2014) developed a classification differentiating Societal Engagement according to its overall objectives and the direction of the flow of information. Starting with this grid/classification, they name five types of Societal Engagement activities: public communication, public activism, public consultation, public deliberation and public participation. The variety of Societal Engagement becomes obvious when comparing public communication and public participation: Public communication gives the citizens rather a passive role by only informing or by educating citizens about new scientific knowledge or technologies. Also, the direction of information and communication is restricted to 'oneway'. The opposite type would be public participation where the goal is to involve citizens in the complete decision-making process. Furthermore, the communication with citizens, representative groups and institutions is not restricted to oneway, but rather symmetrical and dialogical. Another important aspect is that, especially in pluralistic societies, there exists no singular 'public' but rather many 'publics' ((Mejlgaard, Ravn 2015, p. 15); Carson, Martin (2002)).

Probably resulting from the various facets of Societal Engagement, no coherent understanding of the concept can be found at Fraunhofer. Arguments in favour of Societal Engagement are either substantial, i. e. claiming that in some respects laypeople are as effective as experts in finding solutions, or instrumental, i. e. research results are more legitimate when societal actors are involved. Individual understandings vary over 'a broad range of topics, such as citizen involvement, science communication, CSO involvement, stakeholder dialogues, policy consulting, cooperation with businesses, engagement for refugees or programmes that appeal particularly younger people' (Teufel et al. 2016, p. 31).

3.2.4.2 Important aspects agreed on by the present stakeholders

With respect to the long-term vision for 'Societal Engagement', stakeholders agreed on a series of Wh questions to be addressed (cf. Figure 9).

Figure 9: Important aspects of ‘Societal Engagement at Fraunhofer’



Besides the questions ‘Who?’, ‘Whereby?’, ‘When?/At which point in time?’, ‘Why?’ and ‘How much (Societal Engagement)?’, the question ‘How?’ was included to think of the way(s) societal participation should be institutionalised and realised at Fraunhofer. An additional question related to the desired future infrastructure suitable to integrate society in Fraunhofer’s research and innovation activities.

3.2.4.3 Long-term vision “Societal Engagement at Fraunhofer”

The following textbox shows the developed informal vision ‘Societal Engagement at Fraunhofer’ in its original (translated) wording:



General ambition:

Fraunhofer covers all levels of participation:

- the agenda setting, at which 30 % of research is defined via societal participation,
 - the research process/research projects and
 - societal debates.
-
- A culture of participation is deeply institutionalised at Fraunhofer.
 - Fraunhofer is a permanent contact point for citizens, also in ‘physical’ terms.
 - Fraunhofer is a key enabler for participation. It points to barriers for participation and helps to smooth them out.
 - Fraunhofer provides resources and leeways for participation.
 - Fraunhofer bears responsibility by pursuing a participatively developed roadmap specifying the Sustainable Development Goals.

3.2.4.4 Long-term goals and actions “Societal Engagement at Fraunhofer”

To elaborate goals and actions suited to structure an organisational transformation towards the developed vision, stakeholders denominated two major clusters of activities: the cluster ‘resources/management’ referring to the governance principles/fields of action ‘capabilities’, ‘capacities’ and ‘subsidiarity’ and the cluster ‘communication’ referring to the fields ‘deliberation’, ‘transparency’ and ‘institutional entrepreneurs’.

Resources and management

For the advancement of Fraunhofer in the participation of societal actors, stakeholders advocated a balanced distribution of resources between the headquarters and the local institutes. Because of the locally very different societal surroundings of the Fraunhofer



institutes, an approach and resource distribution that is adapted to the local needs, e. g. cities as opposed to rural areas, was proposed.

As a major leverage to promote Societal Engagement, a centrally coordinated distribution favouring research towards ‘societal criteria’ should be used. One concrete realization could be to re-distribute the resources of the internal research programmes, e. g. via a KPI indicating the share of research explicitly pursuing societal goals. Such a KPI could be operationalised on the basis of the Sustainable Development Goals¹². Beyond internal research funding, the participating stakeholders favoured criteria related to ‘societal impact’ to be used in annual employee interviews/appraisals and in the evaluation of publications as well. In this context, ‘esteem’ for researchers that explicitly gear their activities towards societal needs is considered to be an important ‘soft’ resource. To equip the Fraunhofer staff with the necessary time and further leeway, special leaves for Societal Engagement were proposed. To build up the required individual competences, stakeholders favoured an education/training programme for participation, e. g. integrated in IPR courses, combined with special events for executives and new staff.

Communication

For Fraunhofer to be a key enabler for participation, a charismatic moderation of the process in the organisation and beyond should be established, following the principle ‘acting credible and exemplary to convince others’. To realize participation at the different levels, interdisciplinary working groups with Fraunhofer internal and external actors should be set up, who could be composed randomly to ‘see beyond one’s own nose’.

Societal engagement at Fraunhofer should not only involve the use of target group specific media but also further communication modes, including the participation of various societal actors via committees or stakeholder approaches, e. g. involving work councils, schools and the craft sector at the different levels of participation, or to organise specific participatory conferences. To account for the local dimension of societal participation, stakeholders are in favour of creating contact points, e. g. when contact persons are needed or citizens are interested in Fraunhofer’s activities. Finally,

¹² <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>



societal engagement is also understood as a fulfilment of the education mission, which could be realized in cooperation with schools and other educational institutions.

3.2.4.5 Ideas for pilot activities

Among the levels of participation mentioned in the vision, ideas for pilot activities that were collected by the stakeholders primarily address the level of research projects and the level of societal debates (cf. Figure 10). Some ideas address the institutionalisation of activities related to Societal Engagement more directly, e. g. in the form of new functions, competences and incentives.

Figure 10: Ideas for pilot activities in the field of ‘Societal Engagement at Fraunhofer’





At the level of societal participation in research projects, two major ideas came up: implementing a concrete participation in a cooperation project with industry, e. g. in the development of ideas, and project-based structural support for small companies in the region to support the mobility transition, being of direct benefit to society. Also, the test of a tinker lab format in a research project was proposed. Societal debates about both research *and* societal participation *in* research could be promoted by publishing in popular science media, participating in public events such as science slams or joint trips of scientists and citizens to relevant places, e. g. the Innovative Citizen Festival¹³. To stimulate debates about societal participation in research at ‘high levels’, e. g. the Fraunhofer executive board or the Federal Ministry of Education and Research, a ‘participation manifesto’ was proposed that could point to barriers to/enablers for participation.

Pilot ideas that could provide routes to a long-term institutionalization of societal participation relate both to new local functions – in this case of the Fraunhofer UMSICHT institute – and to Fraunhofer-wide structures: At the local level, the idea of testing a permanent contact point/constituency surgery for local citizens who want to be informed about the institutes’ activities was raised. Another idea for local participation was to set up a ‘dash button’ for selected local actors, e. g. to send signals for environmental problems that may be addressed by the institutes’ research. For Fraunhofer as a whole, more institutes could be developed towards particular competences related to societal participation. Moreover, systematic incentives for Societal Engagement in research and innovation could be realized by extra pays for staff being very active in this field.

3.2.4.6 Comments of the Advisory Board and their implications

The comments of the Advisory Board on the developed ambitions pointed to a series of critical points: It was positively stated that hardly anyone would be opposed to the proposed goals, but this could also be due to the fact that the level of specification at this point in time is rather low. Therefore, the next steps, the short-term piloting activities and the development of a long-term Societal Engagement action plan, should clearly address how a real structural change in the organisation is going to be ensured. On the one hand, this includes providing an answer to the question how to reach about

¹³ <http://www.innovative-citizen.de/>

the same (high) level of Societal Engagement across all institutes in the long-term, e. g. by internal marketing activities.

In the discussion with the Advisory Board, two concrete ideas for pilot activities were already reflected: a permanent citizen bureau and societal participation in day-to-day projects by means of ‘stakeholder avatars’ (cf. section 3.2.4.7 below). When engaging in a pilot such as the permanent citizen bureau, the expected long-term effect should be clearly specified. This should also include risk mitigation measures, e. g. providing answers to the question ‘What if citizens are not interested?’. In each case, participation should be proactive in terms of the choice of target groups and incentives to get them involved. In a project to involve ‘stakeholder avatars’, the selection criteria/‘algorithms of choice’ for involving certain stakeholder types should be made transparent. It should be ensured that more than the stakeholders and interests one would expect to see ex ante will be involved, by means of an empirical foundation and/or co-construction of the selection criteria. Research projects with stakeholder involvement/societal participation well beyond JERRI could benefit from such an approach.

3.2.4.7 Characterization of the “Societal Engagement” pilot activities

Based on the discussion with the Advisory Board and on the further criteria set out in section 2.6, the pilot ideas of implementing a concrete participation process in projects that are rather atypical for Societal Engagement (such as projects for industry) of setting up/testing a contact point/constituency surgery and setting up/testing a dash button for citizens were selected and further elaborated. The following pilot activities will be carried out by Fraunhofer UMSICHT:

- **‘Citizen’s bureau’**
- **‘Fraunhofer Debate’**
- **‘Stakeholder Avatar’**
- **‘UMSICHT Dash Button’**

‘Citizen’s bureau’

Project duration: 08/2017 – 05/2019 (at the latest)

Effort: 6 person months



Expected long-term impact: Viable low-threshold format for exchanges between citizens, civil society actors and scientists

Activities:

On a fixed date, the institute will have a citizens' meeting in which social needs can be put forth to science. The offer is addressed both openly and purposefully to school classes, civil society organisations and municipal institutions.

'Fraunhofer Debate'

Project duration: 08/2017 – 05/2019 (at the latest)

Effort: 6 person months

Expected long-term impact: Viable low-threshold format for exchanges between citizens, civil society actors and scientists

Activities:

Fraunhofer UMSICHT has organised the 'Debate' format at various occasions in the past several years. In this context, topics with current social relevance are identified within the institute and are intensively discussed with external experts. These discussions often pave way to find relevance within the institute's own scientific work. So far, the financial crisis, food vs fuel debate, innovative nutritional concepts, the idea of a post-growth economy, the increasing secularisation of society has been the topic of discussion. During the pilot phase of the JERRI project, this format will now to be stepped up and opened to include wider members of the society besides subject experts.

'Stakeholder avatar'

Project duration: 08/2017 – 05/2019 (at the latest)

Effort: 6 person months

Expected long-term impact: Integrating social interests more easily and continuously into the day-to-day research practice

Activities:



In order to realise the fullest impact of scientific work on the society, it is sensible to involve citizens' interests beforehand in the concept development and planning phase. To do so, it would therefore be important to grasp the societal needs and concerns before a first real dialogue (e.g. a stakeholder workshop). Within the framework of the pilot, a web-based crawler concept will be developed. The algorithm will systematically browse the World Wide Web for relevant social interests on a Web-basis, and index it according to the specific scientific project's interest. The algorithm can be fine-tuned to best cater for the spatial, temporal and longitudinal needs of the society. The results from this crawler will be used to construct a Stakeholder Avatar which will identify important constraints during the conception and planning of future research and provide an informed basis for the first physical engagement with the society.

'UMSICHT-Dash-Button'

Project duration: 08/2017 – 05/2019 (at the latest)

Effort: 6 person months

Expected long-term impact: Integrating social interests more easily and continuously into the day-to-day research practice

Activities:

The use of an UMSICHT Dash Button or a mobile software application will be explored to enable sustained citizen engagement in environmentally relevant scientific topics on a continuous basis. This engagement template will facilitate an instantaneous and effortless integration of citizen needs, interests and concerns in environmental topics to the forefronts of scientific discussions. Upon successful piloting of this engagement format, lessons could be drawn to widen the reach of such a template to socially relevant topics as well.

3.2.5 Science Education

Science Education as understood by the literature (cf. section 3.2.5.1) can be attributed a rather weak degree of institutionalisation at Fraunhofer. Science Education activities in JERRI thus aim at engaging in rather basic knowledge creating and sense-making activities instead of already piloting a structural change. Accordingly, the goal development process included the stakeholder-based development of a vision instead



of translating this vision into concrete goals and actions, topics for a future mutual learning inside and outside the organization were identified.

3.2.5.1 Conceptual starting point

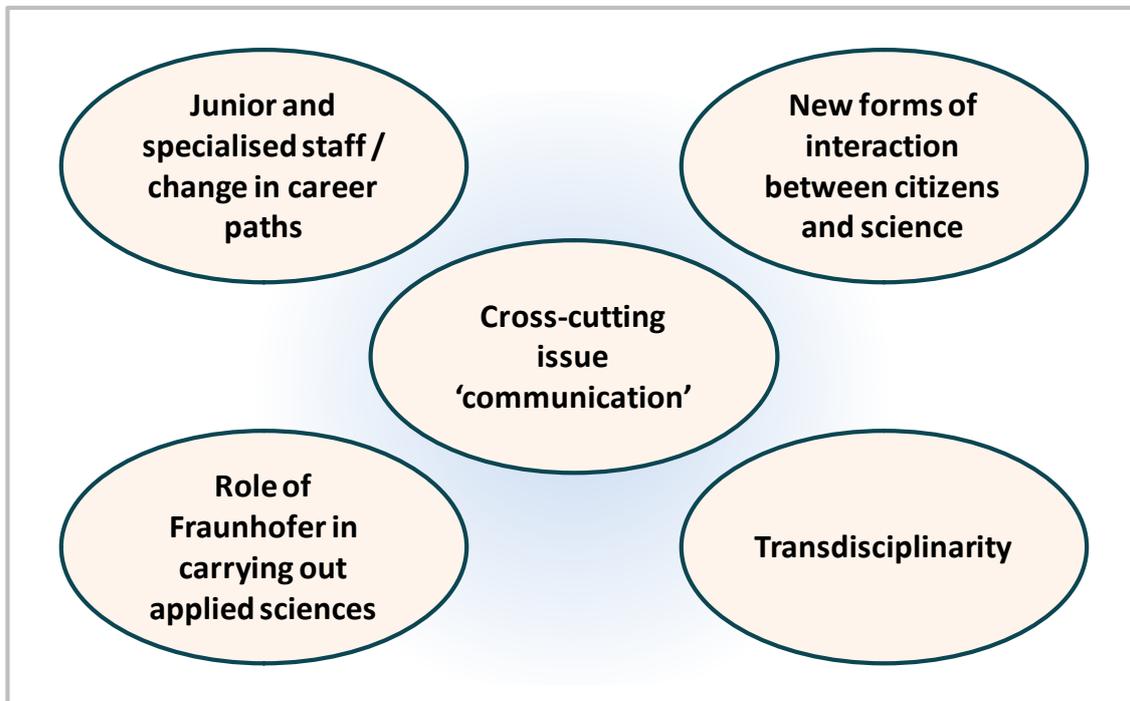
The concept of Science Education is very close to the RRI key dimension of Societal Engagement and can also be seen as a condition for successful participation activities (Talmon-Gros, Teichler 2015, p. 16). Although the evolution of the term reveals the lack of a widely shared and definite understanding, there is a classical understanding of the closely related concept of scientific literacy aiming at a widespread ability of citizens to understand basic scientific terms and constructs in order to be able to participate in the public debate on science, to argue in favour of her or his position, and to be committed to the basic norms and principles of science (Talmon-Gros, Teichler 2015, p. 13; Miller 1998). While the classical definition of Miller sees the citizens rather in a passive role, newer concepts of Science Education – for example the concept by Allum (2010) – emphasise a more active role of the citizen, implying that Science Education should also strengthen its ability of *doing* science.

Whereas Science Education cannot explicitly be found in Fraunhofer's organisational structure and framings (Teufel et al. 2016, p. 35), some well-developed functions such as the HR marketing and Science Communication can be attributed to this concept. The discussion at the JERRI state of the art meeting (Teufel et al. 2016, p. 12) pointed to some conceptual dimensions that could be potentially relevant for Fraunhofer: bringing young people to research, scientific literacy, science communication and interdisciplinarity. These aspects were used as a starting point for engaging in the workshop-based stakeholder discourse.

3.2.5.2 Important aspects agreed on by the present stakeholders

According to the participating stakeholders, the following aspects are particularly important when engaging in a discourse about Science Education at Fraunhofer in the future (cf. Figure 11): In general, stakeholders wished to see a focus on the participation of society in the scientific process.

Figure 11: Important aspects of ‘Science Education at Fraunhofer’



In this basic sense, the following aspects were highlighted: (1) the acquisition of junior and specialised staff, for a better inclusion and research quality, and more female researchers, especially in the STEM professions; (2) the role of Fraunhofer as in carrying out applied sciences, e. g. its connections to basic research; (3) new forms of interaction between citizens and sciences, in terms of scientific literacy and citizen empowerment; (4) transdisciplinarity as a competence to create openness and communication, between disciplines and with society; and (5) communication as a cross-cutting topic, including brand communication and the communication of research as a solution to societal challenges. Stakeholders wished the vision to feature the following characteristics: transparency, feasibility according to a concrete action plan, and the reflection of (social) responsibility.

3.2.5.3 Long-term vision ‘Science Education at Fraunhofer’

The following textbox shows the developed informal vision ‘Science Education at Fraunhofer’ in its original (translated) wording. Stakeholders attributed some general principles to this vision:



Junior and specialised staff/change in career paths:

- Fraunhofer actively contributes to lifelong learning
- Fraunhofer possesses unique characteristics and attractiveness for junior and specialised staff via:
 - authentic enthusiasm for (research and) technology at Fraunhofer and
 - junior and specialised staff perceiving a real benefit of working at Fraunhofer.

New forms of interaction between citizens and science:

- Fraunhofer promotes learning (two-way) for topics with high demand.
- Fraunhofer realises/supports citizen science.
- Both employer and employees are ready for alternative/individual career and working models.

Role of Fraunhofer in carrying out applied sciences

- Fraunhofer transfers research content and methods to internal and external students and scientists.

Transdisciplinarity

- Transdisciplinarity is promoted in order to achieve accepted results.

Cross-cutting issue ‘communication’

- External communication differentiates between target groups.

3.2.5.4 Selected topics for a mutual exchange

Taking the developed vision as a starting point, stakeholders articulated a series of further information needs on Science Education. The breadth of these information needs can be interpreted as a sign in favour of the JERRI approach, i. e. to engage in an in-depth mutual learning before engaging in concrete activities to institutionalise



Science Education at Fraunhofer. Information needs were categorised according to learning processes within Fraunhofer and learning processes with external actors.

Information needs/topics for learning within Fraunhofer:

- strategic aspects of science education, e. g. goals, resources,...
- new/flexible career paths
- possibilities for participation/exchange with society

Information needs/topics for learning with external actors:

- development of education/training programmes for transdisciplinary/RRI competences
- bachelor and Master Theses at Fraunhofer: interaction with other scientific institutions
- transferring knowledge on new technologies to society
- communication of Science Education programmes in the organisation
- Different experiences with Science Education in general / exchange of best practices
- how can success be measured?
- new / flexible career paths
- possibilities for participation/exchange with society

3.2.5.5 Comments of the Advisory Board and their implications

The JERRI Advisory Board considers the process of goal-setting and goal identification is ambitious and sound. The four initial ‘definitions/aspects’ of Science Education at Fraunhofer are well thought out (careers/marketing; scientific literacy; trans-/interdisciplinarity; science communication). However, care needs to be taken here on how closely aligned to RRI these processes are. The central goals of RRI will fight against promotion/marketing, and the careers must be sustainable and socially acceptable and proven to be so; literacy must include responsibility, inclusivity and fairness; transdisciplinarity must include the public voice or the knowledge of, e. g., NGOs/societal actors.



There must be clarity on the citizens' roles in agenda shaping. Questions such as 'Can citizens be involved in shaping science at Fraunhofer?' and 'Likewise, can citizen science also mean engagement of science principles?' need to be answered. Science communication following the principle of 'PEST' (Public Engagement of Science and Technology, cf. Wiley 2014) is considered to be crucial, associating itself with deep engagement with society (but which, of course, must use communication tools like TED talks, online, 'cafés scientifiques', fictive techniques etc.).

3.2.5.6 Mutual learning format in JERRI

The mutual learning approach will probably be realized in the form of an exchange/learning workshop to be carried out by Fraunhofer ISI in 2018. Topics will be the information needs for learning with external actors. Further information needs/topics that may be of interest for stakeholders will be identified via appropriate means and will be fed into the conceptualization of the workshop. As already indicated by the collected information needs, the focus of this workshop will be laid upon different experiences with institutionalisation processes and upon the effects of practices and structures related to Science Education under various contingencies. According to the JERRI mutual learning approach, target groups will be RTOs and similar research organisations and further stakeholders at different levels. The output will be a documentation of experiences that will guide Fraunhofer and TNO as well as similar actors to promote and operationalise Science Education within their organisations. Insights will be fed into the further mutual learning process, e. g. via the report D10.3 Good practice RTO engagement manual.



3.3 Commonalities between the goals across the RRI key dimensions

Although the goal development processes were geared towards different key dimensions with clearly defined budgets for the related pilot activities, it is also worthwhile to reflect on the commonalities between the visions, goals and comments of the stakeholders in each process¹⁴. First, it became apparent again that there are many overlaps between the topics as such, also in terms of the related stakeholder landscape. Second, the envisaged development of long-term action plans for an organisational transformation in each field may benefit from a clear idea about commonalities and potential synergies, e. g. by resulting in an overarching action plan for Fraunhofer. Third, RTOs and other stakeholders may learn from what is considered by Fraunhofer as crucial, cross-topic elements for engaging a transformation towards responsible research and innovation.

One commonality of several visions is the connection between the outstanding position of Fraunhofer in the European research landscape and the ambition to take on a leading role in practicing responsible research and innovation. On the one hand, this includes living up to responsibility in an authentic way. On the other hand, Fraunhofer should proactively create visibility of its activities by communication activities specific to target groups in order to fulfil this function. Due to the size of the organisation, the visibility of internal experiences, functions and services inside the organisation in order to tap the full potential of existing resources is an equally important factor. As there are yet many punctual knowledge gaps, stakeholders like to see more outside-in communication/consultancy from the external experts and the scientific community.

In terms of the governance principles set out in the Res-AGorA Responsibility Navigator (Kuhlmann et al. 2016), stakeholders particularly highlighted the role of capacities in terms of organisational resources and (infra)structures for the fulfilment of the formulated visions. In conjunction with this principle, questions about the ‘right’ levels to act within the organisation have been discussed across the topics, referring to the principles of subsidiarity, modularity and flexibility. Further governance principles that came to the fore quite frequently when discussing organisational transformations

¹⁴ Commonalities and differences of the goal setting processes will be subject to Deliverable 10.2 Lessons learned for goal development.



were the necessity of outstanding individuals taking on promoting/entrepreneurial roles, and deliberation mechanisms as a feature of cultural change.

One common feature of many pilot activities is their direct embedding in research projects as the main type of action carried out in the organisation. Across several topics, especially the set-up of use or business cases, role models and the demonstration of good/best practices is considered as a promising type of pilot activity.

Besides existing concepts referring to the institutionalisation of rri in organisations (cf. Randles 2017), these commonalities point to some of the more basic terms and directions to engage in the further institutionalisation of rri at Fraunhofer, e. g. in the development of transformative action plans.

4 Conclusion

The report ‘Description of specified RRI goals at Fraunhofer’ specifies the visions and long-term goals that Fraunhofer and its stakeholders developed as part of work package 2 “Development of RRI goals at Fraunhofer” of the JERRI project. The five underlying, workshop-based goal development processes and results are geared towards the organisations’ and stakeholders’ specific understanding and values related to five key dimensions of Responsible Research and Innovation (RRI) – Public Engagement, Gender Equality, Science Education, Open Access and Ethics. Concrete pilot actions were identified with the stakeholders on this basis, and selected actions by the Fraunhofer project team are described as well as some commonalities between the topics.

The developed, informal visions represent ambitions that can be clearly distinguished from today’s status quo. They indicate that despite existing higher degrees of rri institutionalisation in some areas, there is much potential to further engage in an organisational transformation also beyond the JERRI project. At the same time, the long-term visions and goals and pilot activities are not only logically interrelated but represent a twofold approach necessary to reach the project goals at Fraunhofer: the testing/experimentation of practices which are really new to the organisation, and their embedding in a long-term strategy having started to evolve in this work package and which will be further elaborated in work package 4. Moreover, the identified commonalities between the visions, goals and pilot activities show the overlaps and synergies between the topics and indicate cross-cutting fields of action that seem to be



particularly relevant for the institutionalisation of responsible research and innovation at Fraunhofer.

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ABBREVIATIONS

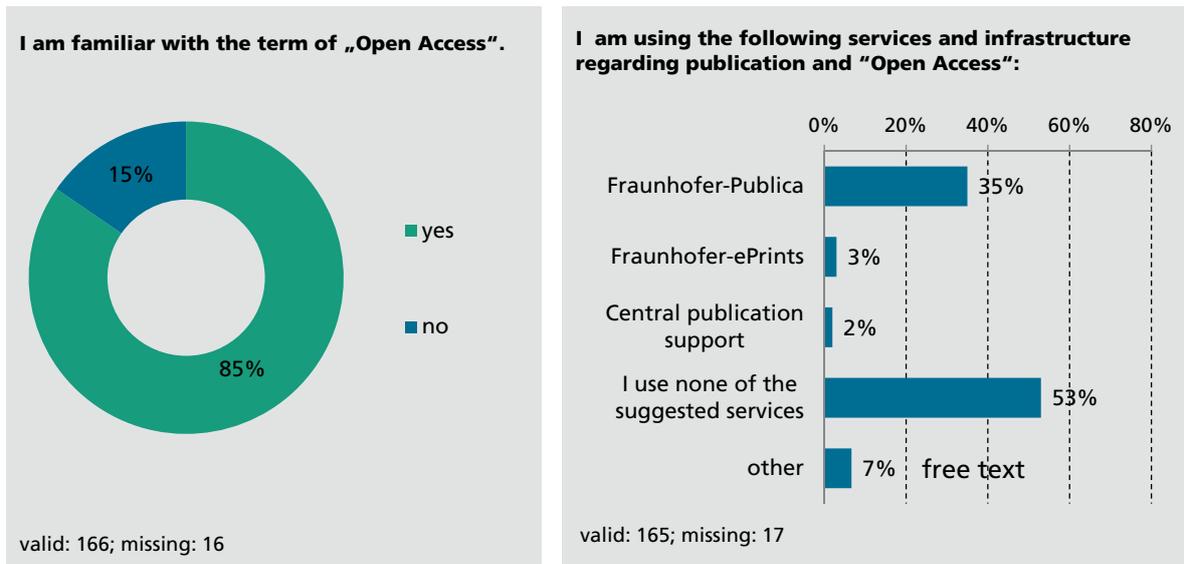
CSO	Civil Society Organization
FIM	Fachinformationsmanager/science information manager
FORDATIS	Fraunhofer Repository for Research Data
Fraunhofer IAO	Fraunhofer-Institut für Arbeitswirtschaft und Organisation/ Fraunhofer Institute for Industrial Engineering
Fraunhofer IRB	Fraunhofer-Informationszentrum Raum und Bau/ Fraunhofer Information Center for Planning and Building
Fraunhofer ISI	Fraunhofer-Institut für System- und Innovationsforschung/ Fraunhofer Institute for Systems and Innovation Research
Fraunhofer UMSICHT	Fraunhofer-Institut für Umwelt-, Sicherheits- und Energietechnik/ Fraunhofer Institute for Environmental, Safety and Energy Technology
DOI	Digital Object Identifier
GEP	Gender Equality Plan
IP	Intellectual Property
JERRI	Acronym for the project ‘Joining Efforts for Responsible Research and Innovation’
KPI	Key Performance Indicator
MAVO	Acronym for the Fraunhofer internal research programme ‘Marktorientierte Strategische Vorlaufforschung’ / ‘strategic market-driven, pre-competitive research’
OAI-PMH	Open Archives Initiative Protocol for Metadata Harvesting
PEST	Public Engagement of Science and Technology
Res-AGorA	Acronym for the project ‘Responsible Research and Innovation in a Distributed Anticipatory Governance Frame. A Constructive Socio-normative Approach’



RRI	Responsible Research and Innovation (as defined by the European Commission)
rri	responsible research and innovation (as discussed in the literature)
RTO	Research and Technology Organization
STAGES	Acronym for the project 'Structural Transformation to Achieve Gender Equality in Science'
STEM	Science, Technology, Engineering and Mathematics
TED	Technology, Entertainment, Design
TNO	Toegepast Natuurwetenschappelijk Onderzoek/ The Netherlands Organisation of Applied Scientific Research
WISA	Acronym for the Fraunhofer internal research programme 'Wirtschaftsorientierte strategische Allianzen'/'Business-oriented strategic alliances'



“Open Access”

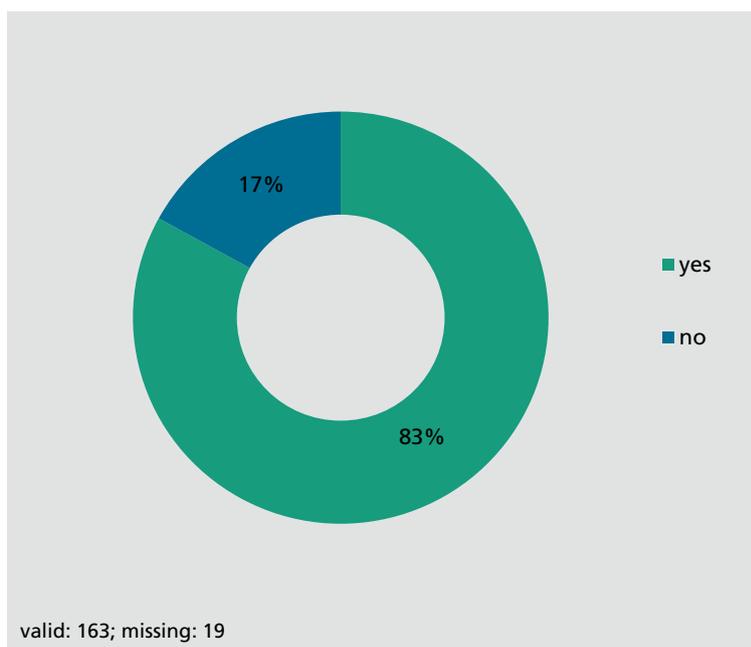


I am using the following services and infrastructure regarding publication and “Open Access“:

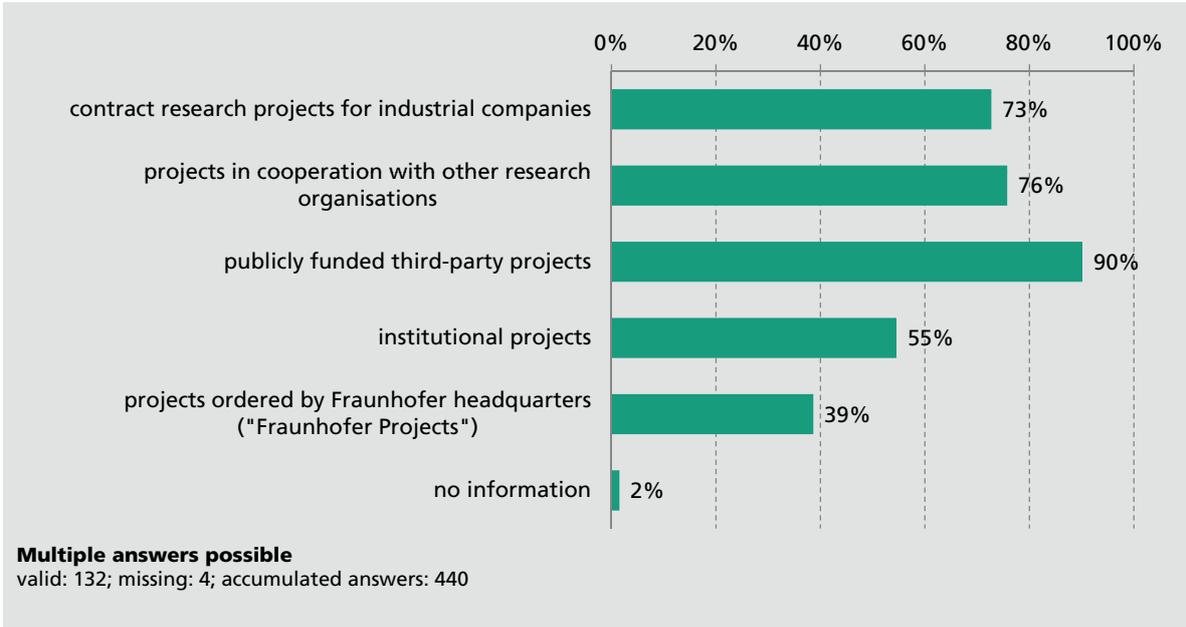
- Elsevier Procedia Open Access Special Issue
- We have a representative at our institute whom you can turn to.
- local “Fachinformationsmanager” (scientific information manager)
- library of the institute
- Pubmed
- usage of access and information to publications at the Fraunhofer Intranet
- Semko (semantic search for competences)
- librarian

Creation of research data

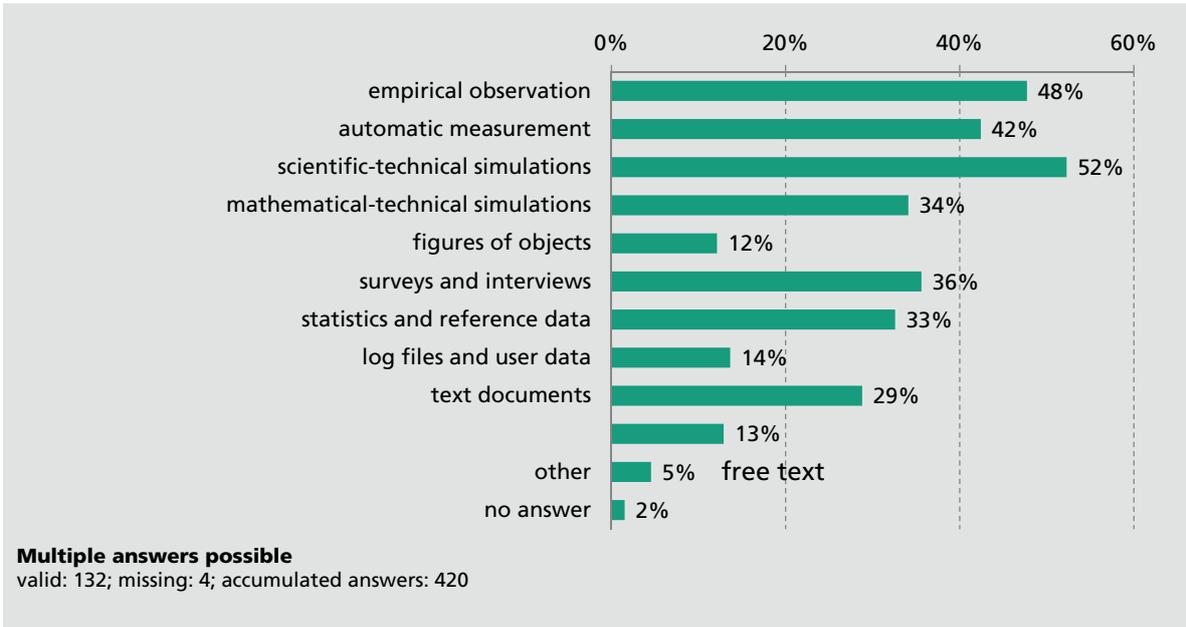
Do you collect research data during your projects?



Within what kind of projects do you collect research data?



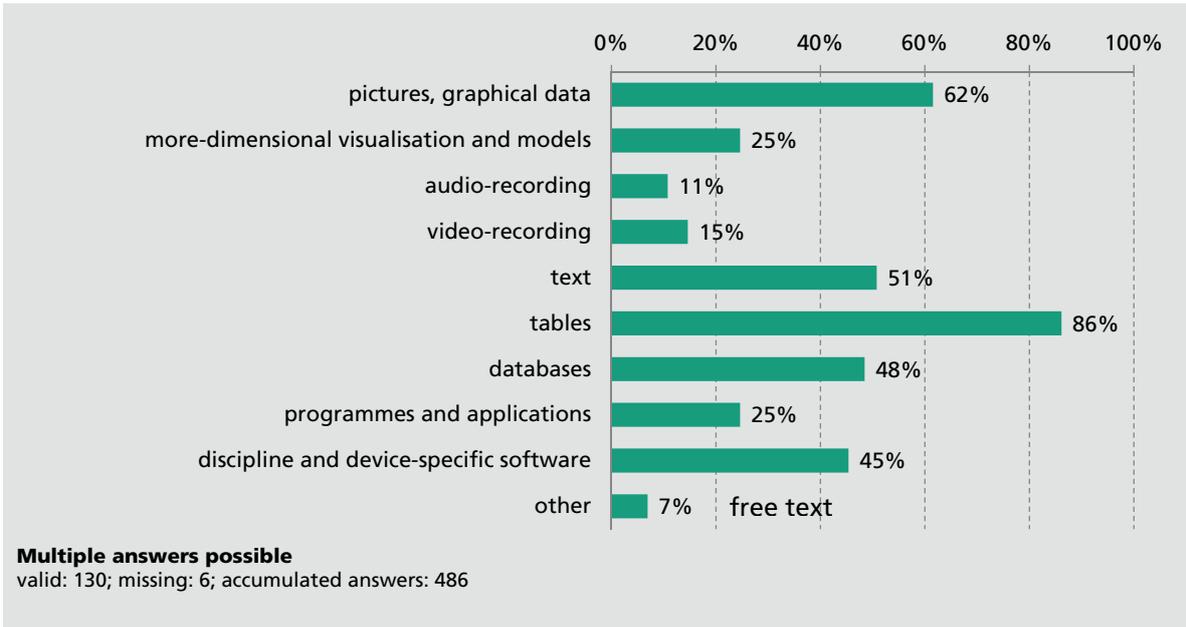
What sources does your research data come from?



What sources does your research data come from?

- surveys
- ERP systems
- APIs
- during evaluation: typed data from grant applications being prepared and used
- data providers of publications or patents
- databases (fee-based or free; own preparation of databases [in-house])

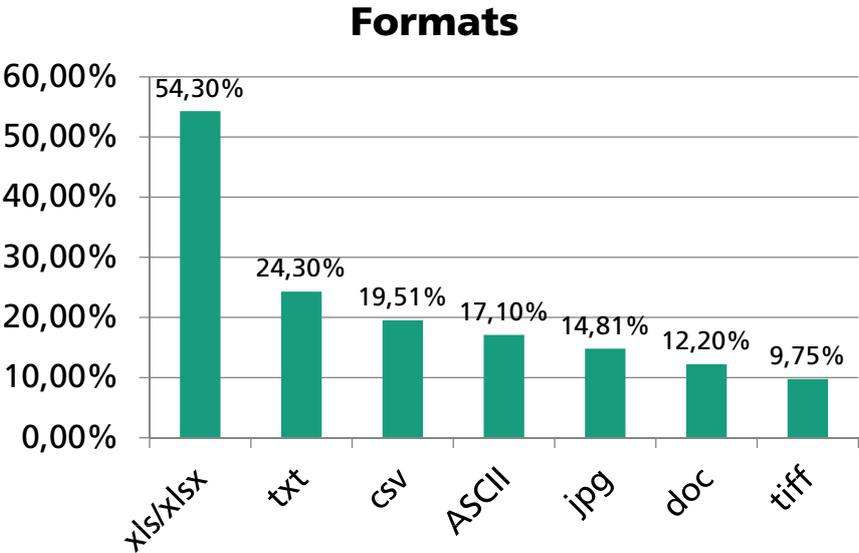
What types of research data do occur?



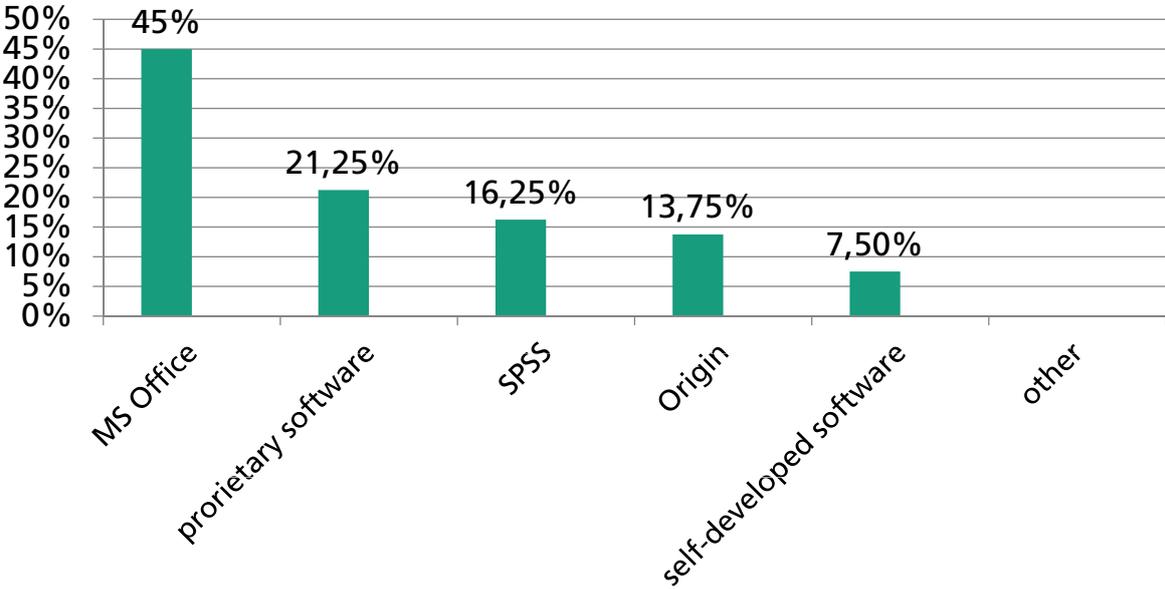
What types of research data does occur?

- transaction data from ERP-systems
- own surveys
- measurement data (raw data/binary, evaluated data [OriginLab, Excel]), PowerPoint presentation for the summary
- electronical measurement data

What format do the data occur in?



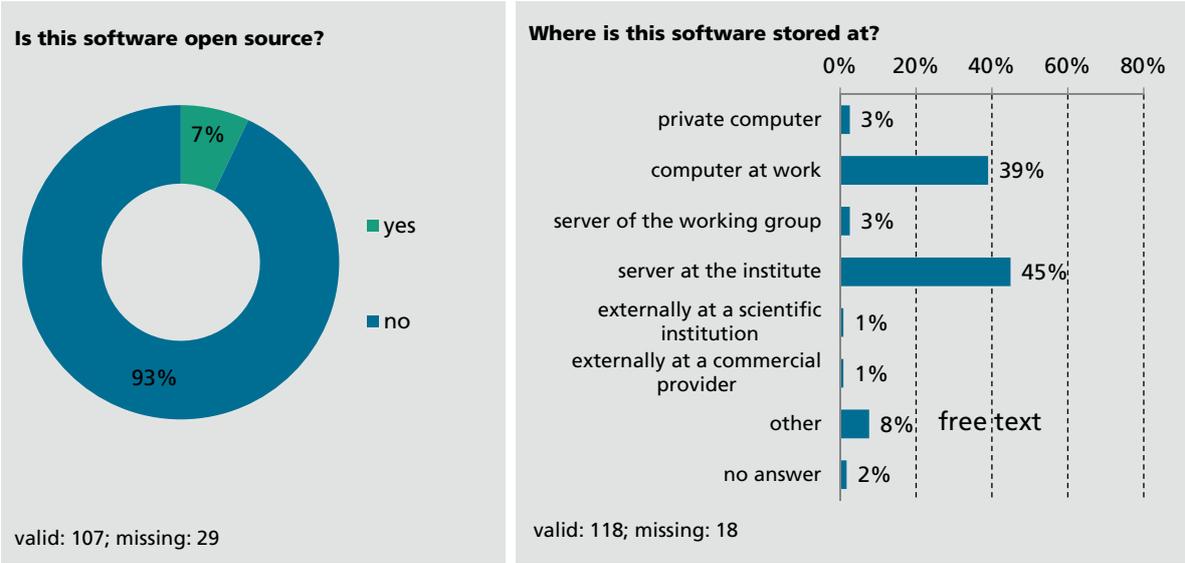
What software do you need to generate data?



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Open Source Software and Storage



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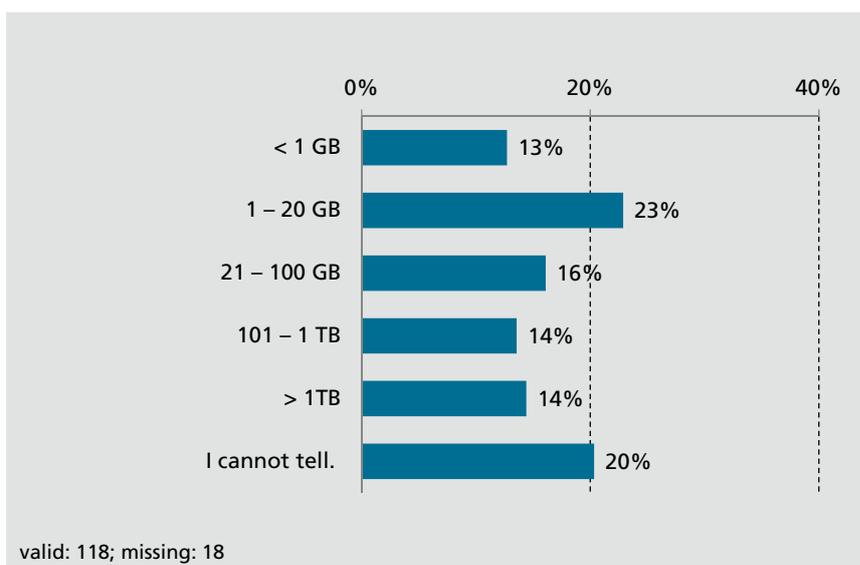
Where is the software stored at?

- depends on the project
- most data stored at the institute, partially on computers at work
- at the client's facilities
- I don't know, in any case not at private computers.
- at the computer at work, at the institute server, some are open source, questionnaire is not differentiated enough
- computer at work, server at the working group, server at the institute
- server at the institute, project drives at the organizational unit
- server at the institute (if this is hosted locally or at another institution, I don't know)

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How large is the overall size of your research data?

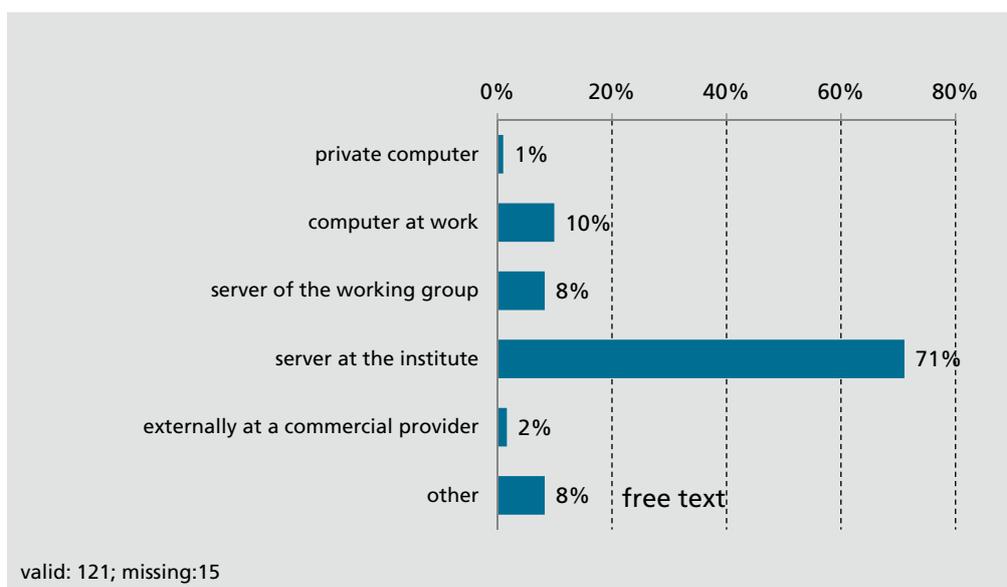


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Research data during the project phase

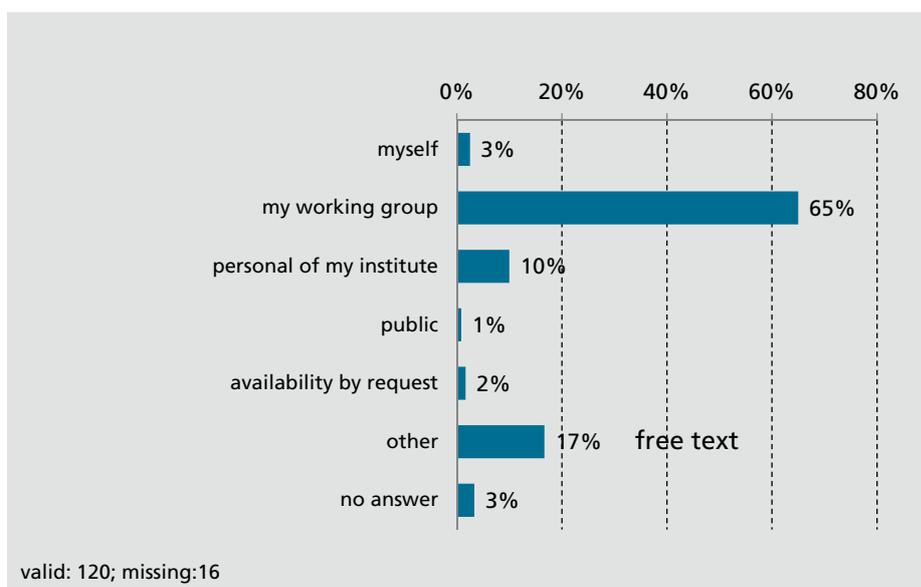
Where is the data stored at during the project phase?



Where is the data stored at during the project phase?

- storage at server at the institute, Fraunhofer Content-Server
- in different projects with different systems, server at the institute, external storage with project partner, storage at external content server
- storage mostly at the institute's server, mostly at the institute's server
- computer at work, server at the working group, server at the institute
- institute server (small amounts of data, for example tables); computer at work --> storage space; data protection
- external device for videos

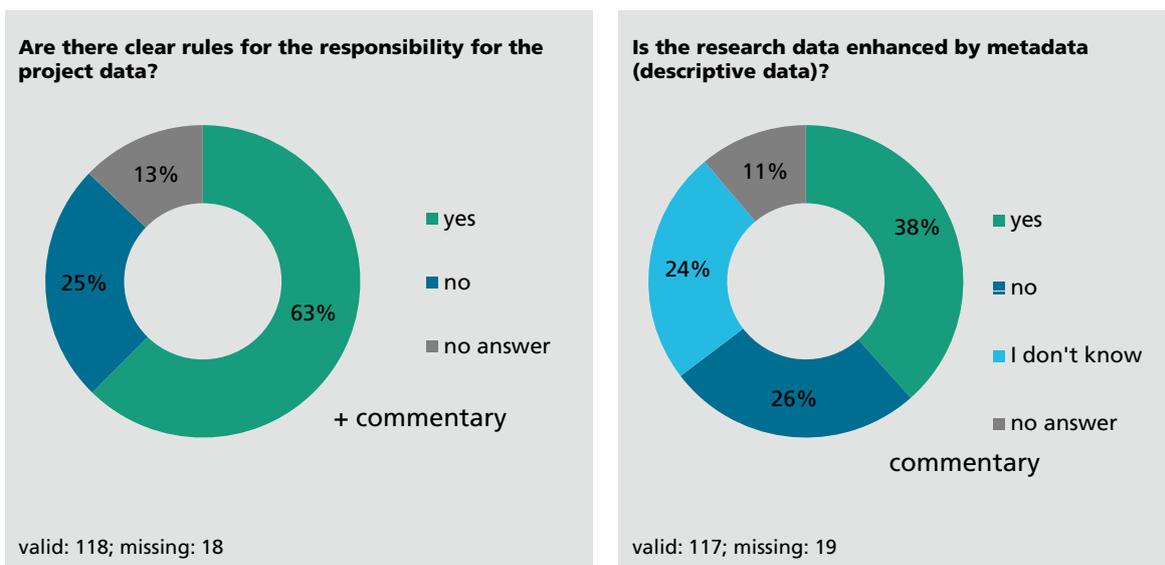
What group of persons has access to data during the project phase?



What group of persons has access to data during the project phase?

- project members, perhaps restricted by access rights
- Generally staff of my institute, the persons can be selected.
- project members (supply by demand)
- all members of my department, further involved persons
- staff of my institute, me, project partner, depends on the system and project
- staff of my location
- my working group; within industrial projects also the customer
- staff of my institute (with restrictions)
- most of the data: my working group; some data: only me/only project members
- project team defined beforehand, Fraunhofer staff of my institute

Responsibility for data and metadata



Are there strict rules for data and metadata?

- No clear answer, there are several levels of responsibility, each with own rules.
- IT guideline of the institute laws and guidelines are adhered to it.
- substantial degree of personal responsibility in matters of data management
- Mostly, there is a non-disclosure agreement (NDA) between the customer and the Fraunhofer-Gesellschaft. Content of this NDA is that data can only be used by this project team for the contract research.
- There is a valid data management plan (DMP) within the department in a test phase.
- Copyrights are considered; sources are cited, approvals are obtained.
- The project leader is responsible.
- Some data is much faster processed on the local computer than on the server and then it is processed there and then copied to the server when done.

With what metadata are the data enriched?

- There are context models for the data.
- dates regarding measurement parameters, samples, date values, project information
- mostly semantic description of table structures, provenience information
- There is project specific, individual information. Standards or standardized processes are not defined.
- date, ID
- empirical analysis, plans for future experiments
- comments, explanations, additional information...
- partially: time stamp, editor
- e. g. creator name, interviewer name, subject name, research question where required, project, survey period, survey location; depends strictly on data itself;
- kind (type), firm, project (name, number), author

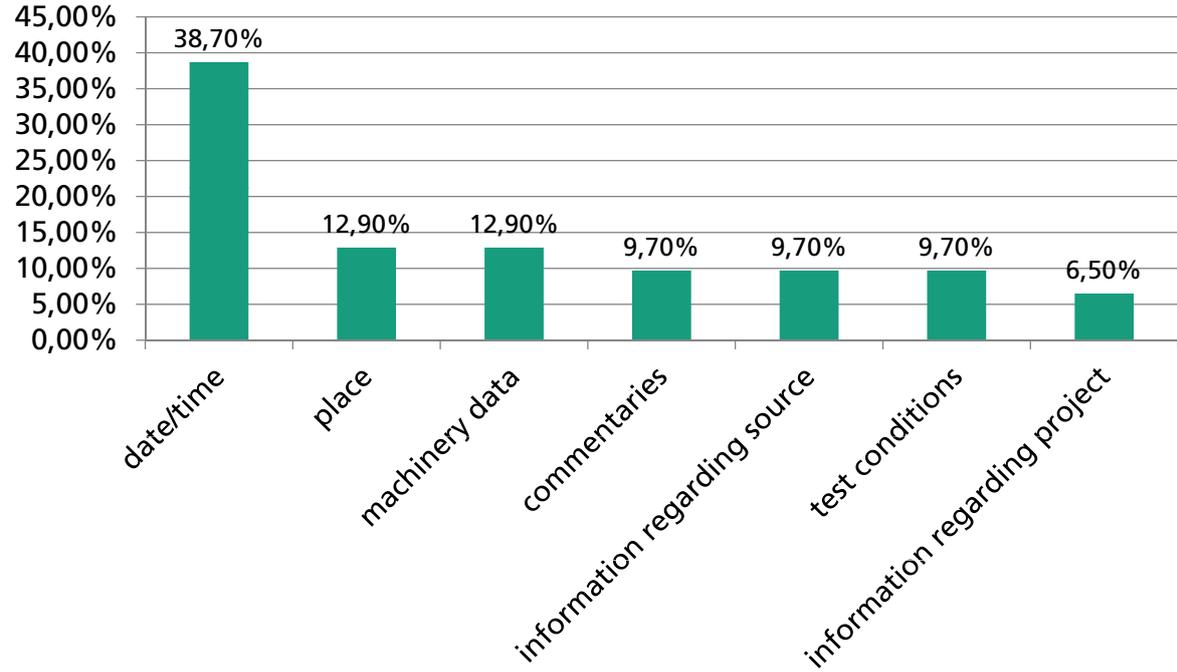
If yes, by what kind of metadata? Is there any standard used? (I)

- for example own analyses, own calculation, own representation, applied procedure or calculation method, corresponding sources
- in Excel: e.g. comments, different font colour, different coloured filling of the cells
- executing, sample classifying, test condition
- place, time, trial components and their conditions
- analyses und aggregation
- experimental protocols/SOP, information for trial material (cell cultures, chemicals, other consumables, measurement parameter)
- variable explanation
- information regarding place, date, editor
- date, time of the measurement
- sources, projections, classifications, etc.

If yes, by what kind of metadata? Is there any standard used? (II)

- type of machinery, conditions (temperature, wet, load speed, etc.) the experimental trial data is gathered with; version of FEM programmes or compilers numeric results are created with
- machinery data, time stamp
- at least date, measurement machine, allocation, commentary
- date, time, sample name, measurement conditions
- information for measurement machinery, experiment planning, analysis routines

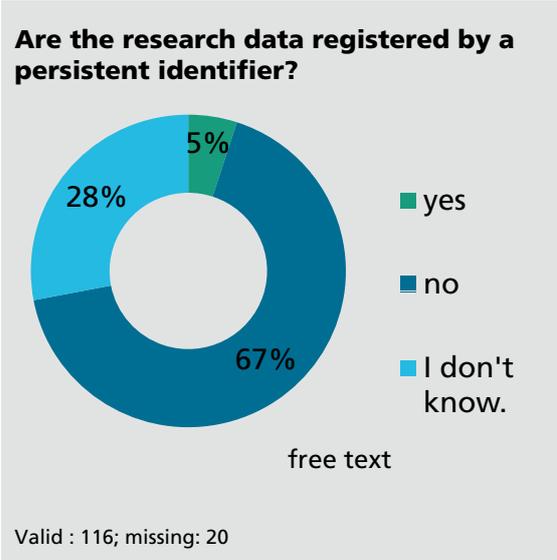
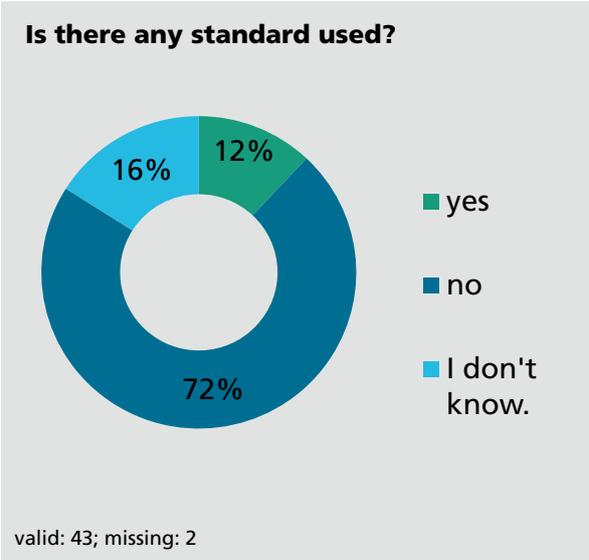
With what kind of metadata?



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Standards concerning metadata und Persistent Identifier



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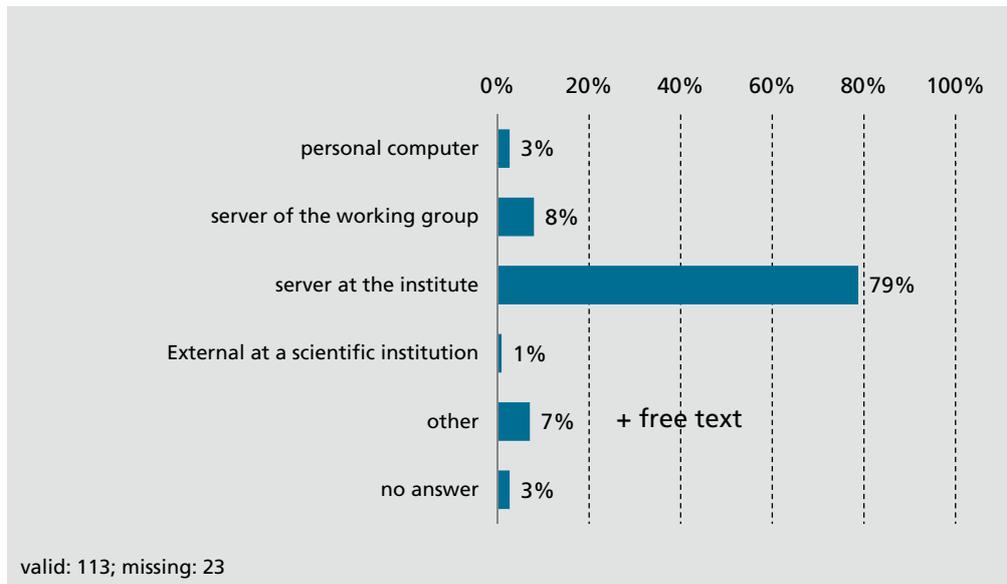


Is the data enriched by Persistent Identifiers?

- We create data points continuously. These data points are requested via APIs from our users. To my knowledge, DOI are poorly usable for this kind of request.
- We are currently working on a procedure for a simplified annotation of assays via Persistent Identifiers.
- In most cases yes, but not generally. The same applies to the enrichment of data with metadata.
- only partially
- probably yes in other branches of my institute; not in my department
- only in publications, not in measurement data
- unless you mean the name of the file
- The raw data already include identifiers. Therefore, raw data are not enriched with identifiers.
- partially via unique assay identification numbers.

Research data at the end of the
project

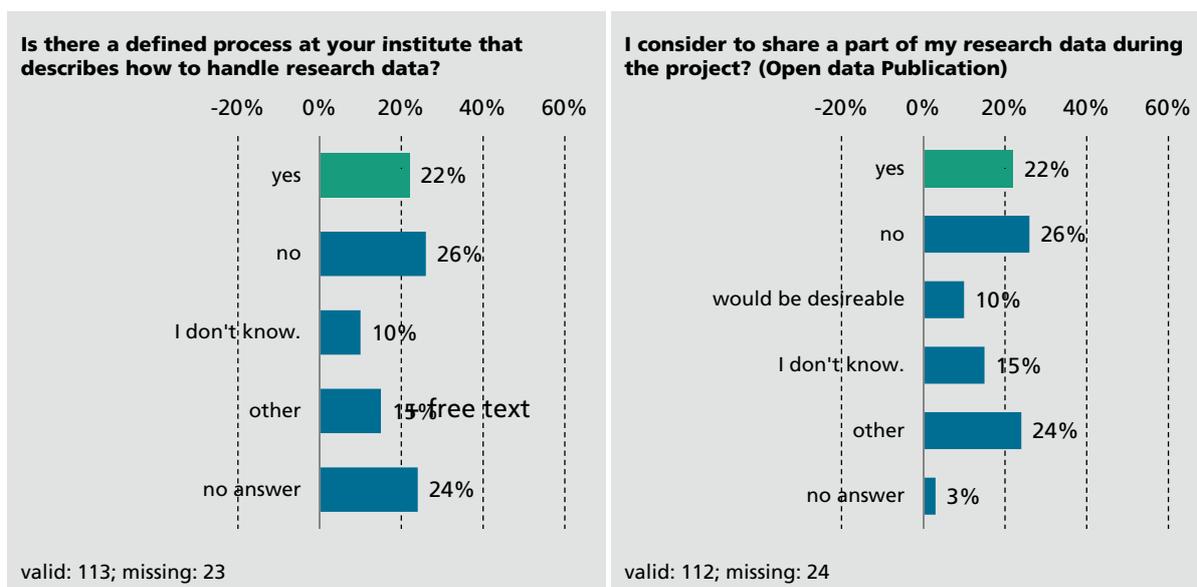
Where is the data stored after the end of the project phase?



Where is the data stored after the end of the project phase?

- DVD
- external at project partners, third-party funder
- access controlled and encrypted project folder, sometimes deletion of raw data is necessary
- CD

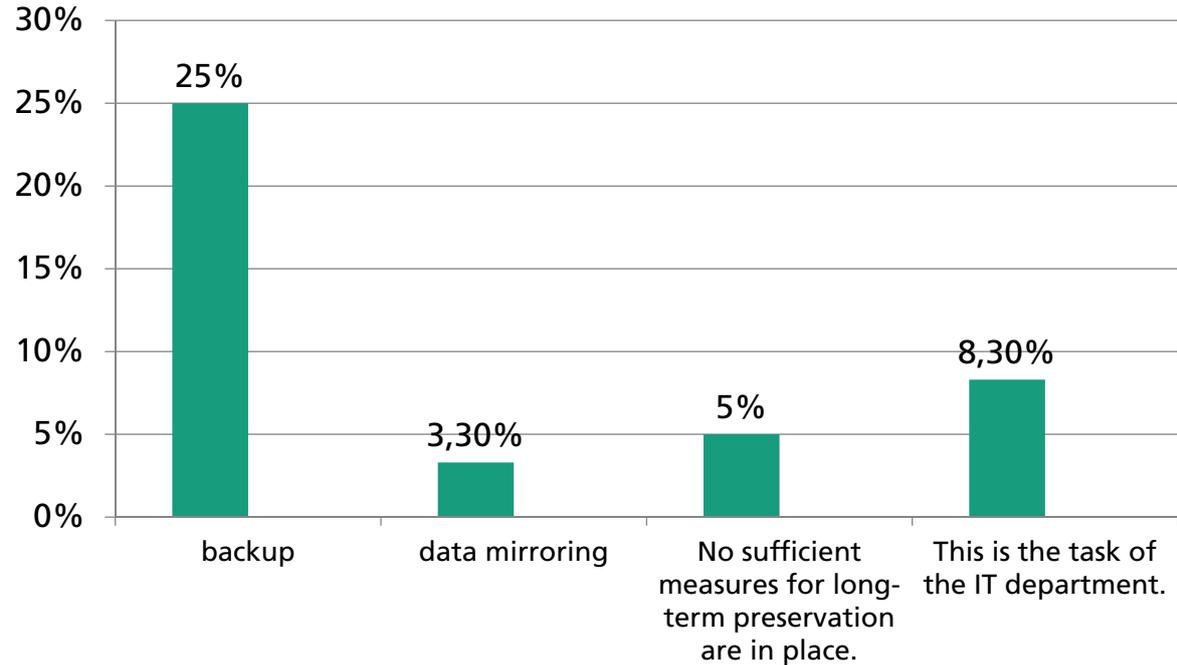
Handling of research data



Is there a defined process at your institute that describes how to handle research data?

- We have defined in a data management plan (DMP), how the data is stored. At the moment we test the realisation of the DMP in daily processes.
- DMPs have been used since February 2017.
- The process is in development.
- no for raw data, for the project mainly yes

What measures regarding long-term preservation are taken? (I)

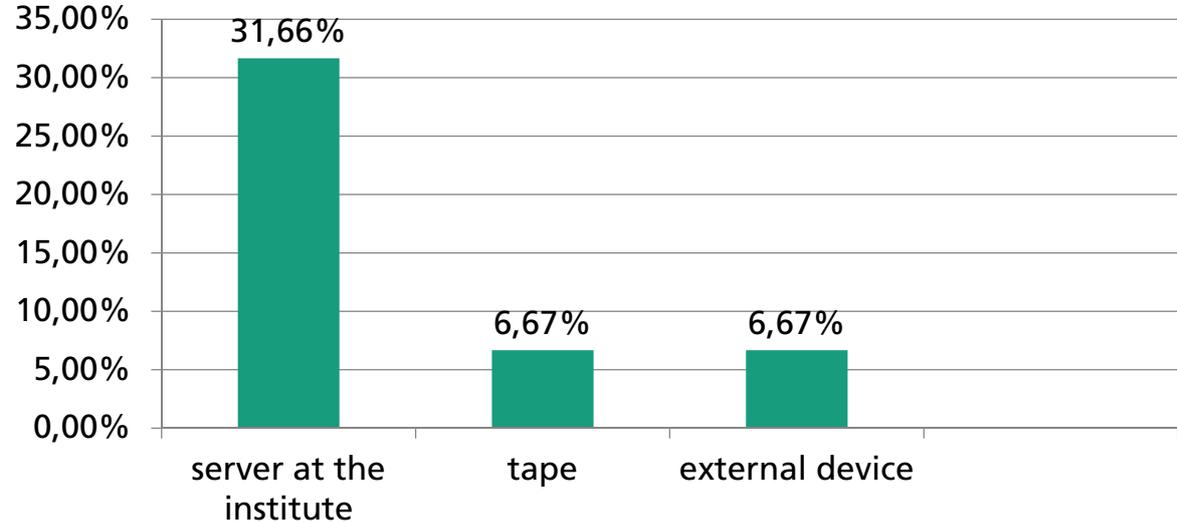


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What measures regarding long-term preservation are taken? (II)

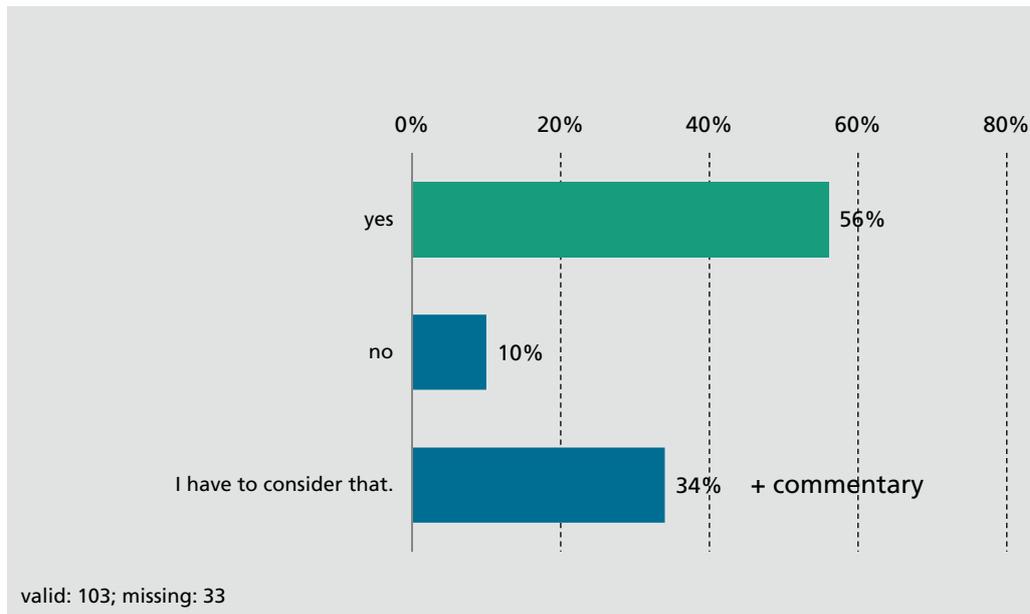
Long-term preservation



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I consider to share a part of my research data during the project. (Open data publication)



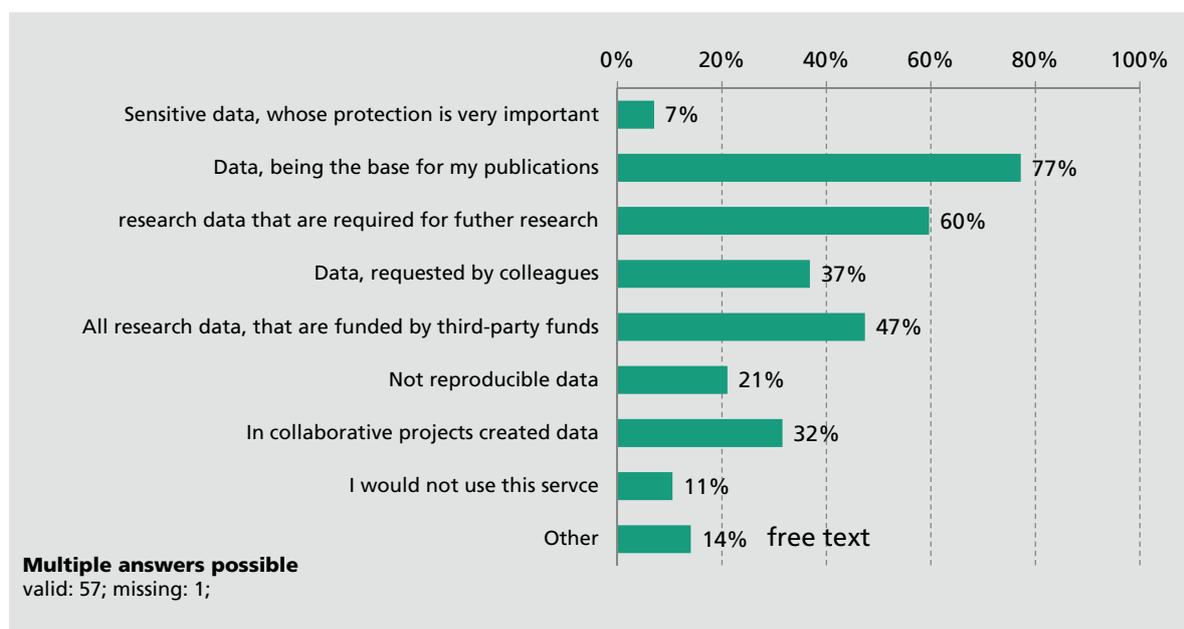
I am willing to publish a part of my research data after the end of the project if certain conditions (clearance of copyright issues, reference methods are available, support and infrastructure are established) are met.

- Much educational work is necessary
- depends on the project, only if demanded
- We consider data as customer property and need this trust in the exclusivity of the data
- If data is published, there is a risk to reveal information that is usable in the future
- A problem of open data or shared data is the imprecise definition of shared data.
- no, because of enormous effort

Reasons against publishing

- Property rights of the data are cleared years later, this would be difficult after publication.
- no time
- no pay
- information need for further exploitation

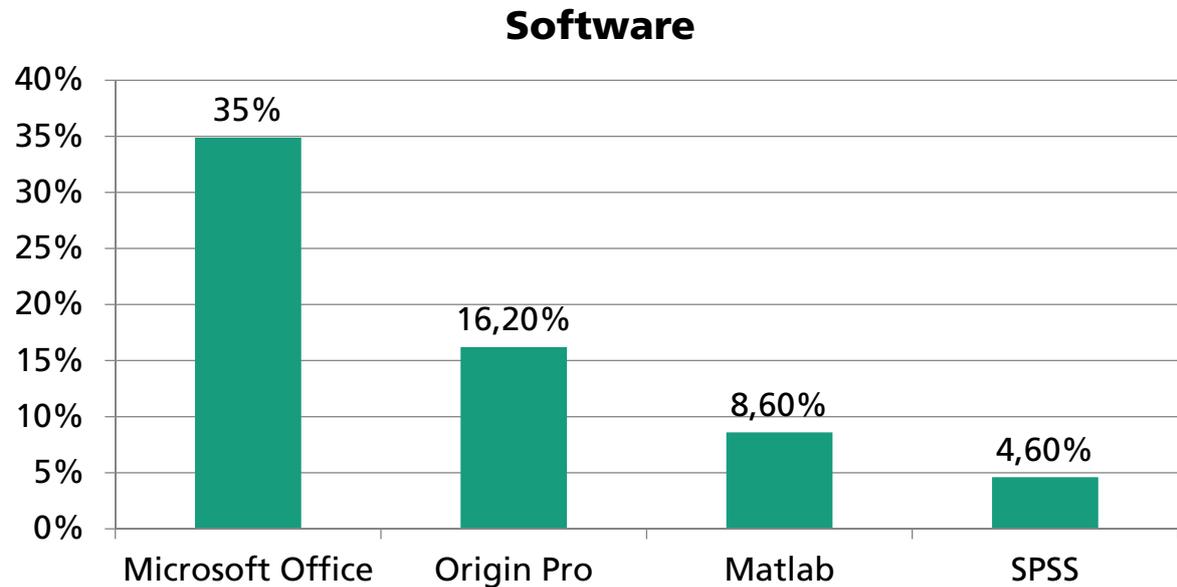
If yes, what kind of data would you publish?



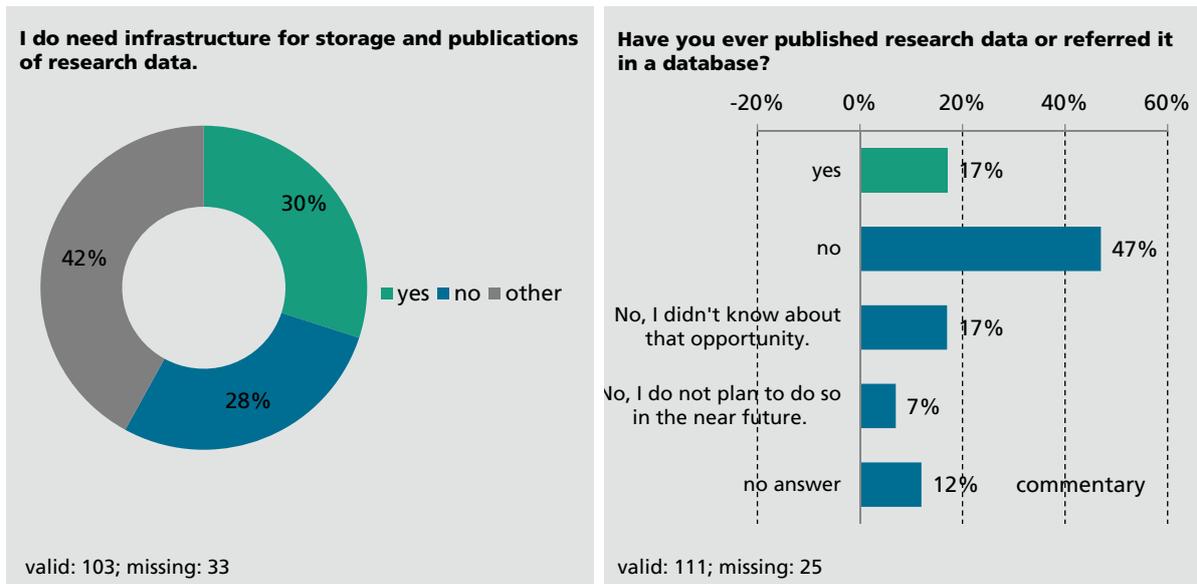
What kind of data would you publish?

- A Fraunhofer policy is necessary.
- In case of third party funded projects, all data, even those of failed experiments, should be published. You should not underestimate the documentary effort.
- I would publish all research data in case of the permission.

What software is necessary for editing and reuse of the data?



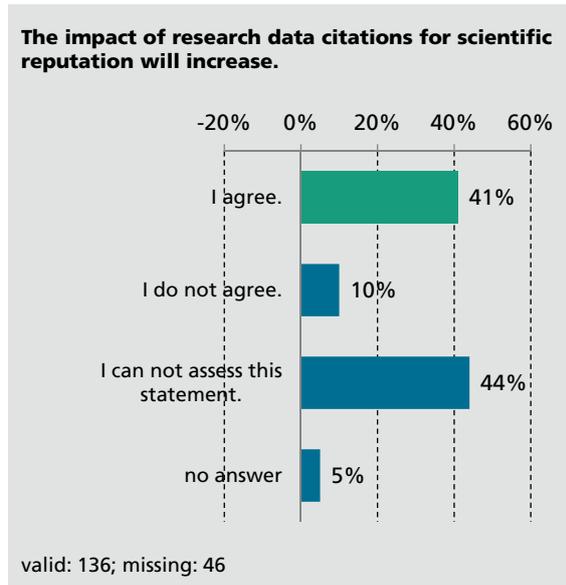
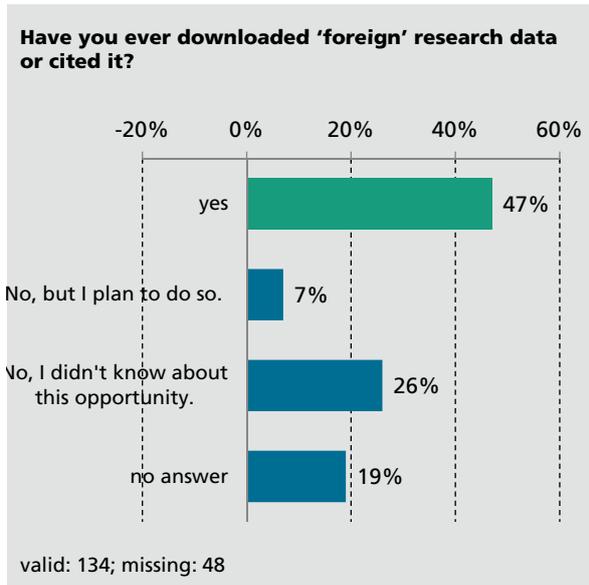
Publication and referencing of research data



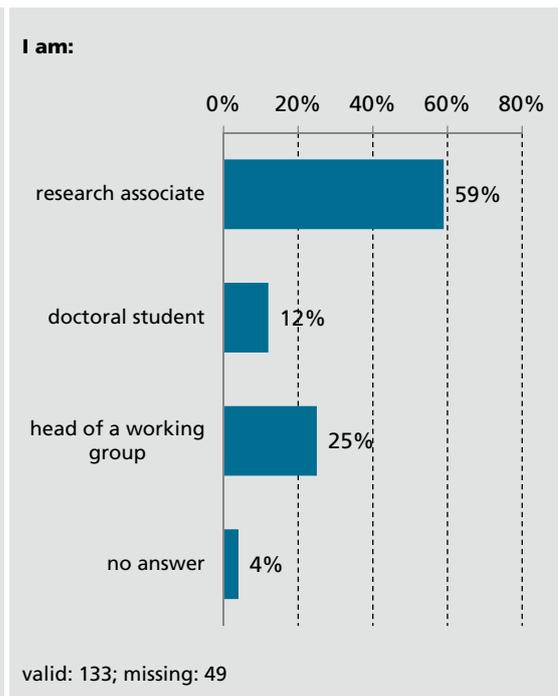
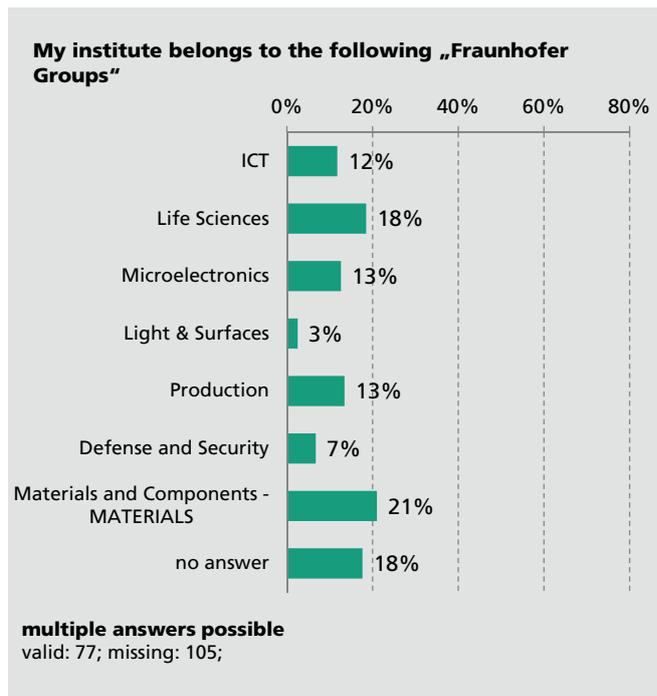
Have you ever published research data or referenced it in a database?

- GESIS (Leibniz Institute for the Social Sciences)
- several publications at conferences
- website
- scientific journals
- journals, NCBI (National Center for Biotechnology Information), ftp server (sequence data)
- PeerJ (Open Access publisher for the biomedical sciences)
- in reports
- for the EU Commission that has processed the data
- as R-Package on CRAN (The Comprehensive R Archive Network)
- ETH database during an employment at ETH Zürich (Swiss Federal Institute of Technology in Zurich)
- publication on institutional server

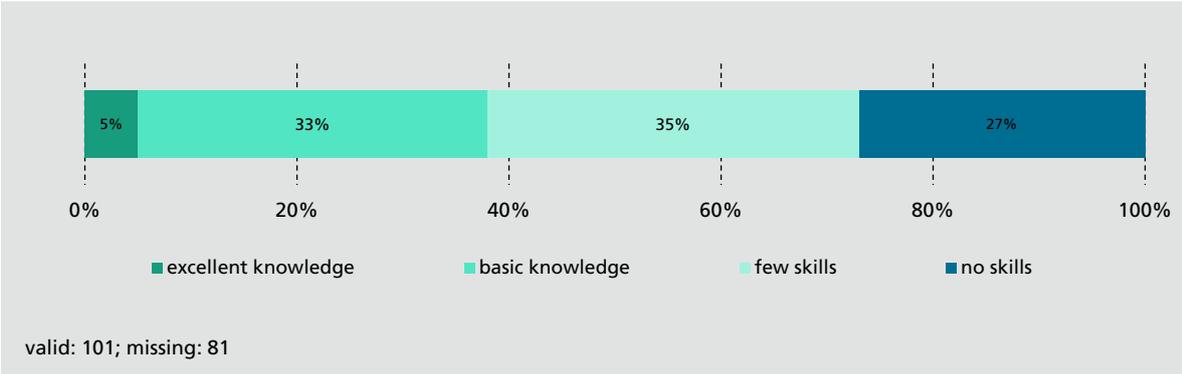
Use of 'foreign' research data



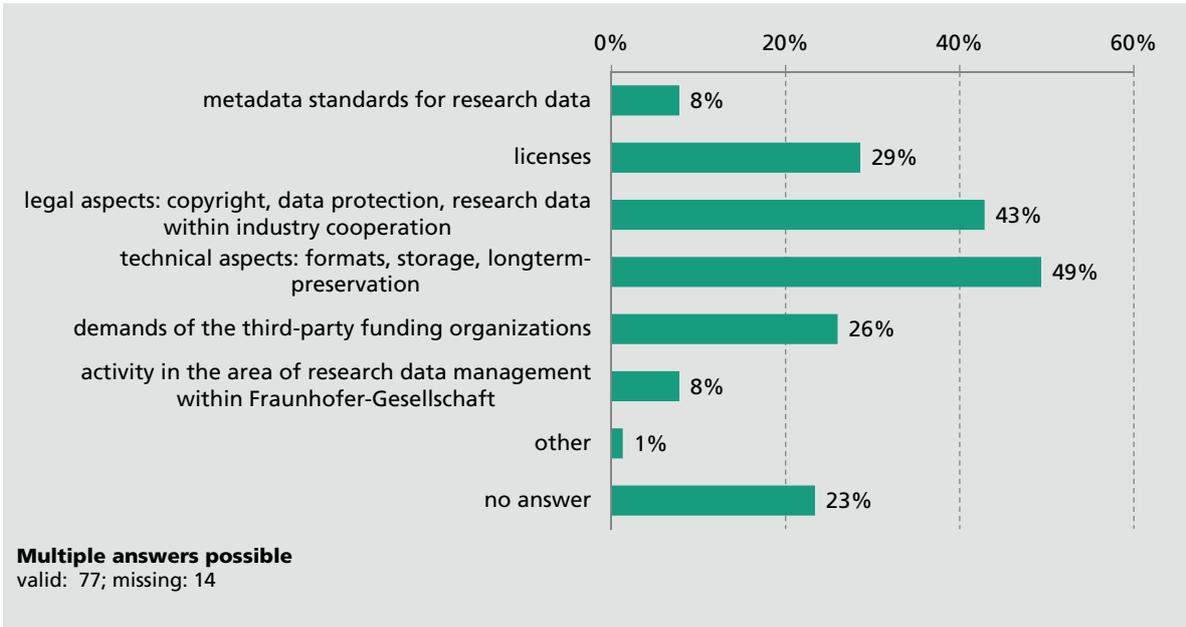
Personal Questions



I have knowledge on Research Data Management:



If yes, at the following aspects:



The following support in the area of research data would be interesting for me:

