Basic Report

BERLIN SCIENCE SURVEY

Pilot study winter semester 2021/2022

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1. About the Study

The Berlin Science Survey (BSS) is a trend study that surveys the perspectives of researchers in Berlin every 2 years. The survey focuses on the development of research practices and scientific culture in Berlin as a location for science, as this culture is continually changing, not least due to supra-organizations such as the Berlin University Alliance (BUA) or the Berlin Research 50 (BR50).

The scientists' experiences and assessments as well as the conditions for research, which can vary greatly depending on the culture of the disciplines, are to find their way into a critically reflexive monitoring of intended and unintended effects of science policy control.

The pilot study of the Berlin Science Survey was conducted in the winter semester 2021/22. The online survey targeted all academically active individuals at the four BUA institutions – Freie Universität Berlin (FU), Humboldt-Universität zu Berlin (HU), Technische Universität Berlin (TU), and Charité-Universitätsmedizin Berlin. In addition, researchers from the Berlin Research 50 institutions were invited to participate in the survey.

The pilot study focused on the topics of open science, cooperation, and knowledge transfer against the background of the more general question of how science policy objectives affect research practices and research quality.

The Berlin Science Survey is designed to survey the experiences and opinions of scientists in the Berlin metropolitan area at regular intervals in order to reveal changes and trends over time in the research practices, discourses, and attitudes of scientists.

Through regular surveys and the introduction of the results into the science policy discourse, the scientists can participate in changing and shaping the BUA and the Berlin research landscape.

More information about the study can be found on our website: www.berlinsciencesurvey.de

The first results of the pilot study are presented below. Core statements on each topic addressed in the pilot study are presented to create the basis for in-depth detailed analyses, which will be prepared and published in the following weeks on a topic-specific basis. The focus of the basic evaluation is the descriptive presentation of the core indicators. The detailed analyses will then include further, smaller-scale statements and also consider the statements in the context of covariates, such as gender, academic age, status group, and subject group membership.

A total of 1,842 respondents participated in the pilot study, of which 1,098 respondents with complete interviews and privacy statements are included in the processed net analysis data set.

Respondents are distributed slightly differently across the four BUA institutions: 26.8% of respondents are from FU, 17.7% are primarily from HU, 14.4% are from TU, and 20.7% are from Charité-Universitätsmedizin Berlin. Another 24 % of the respondents are primarily employed at non-university research institutions.

In our sample, the life sciences account for the largest share with just under 30%, followed by the social sciences with 24.4% and the natural sciences with 22.2%. The humanities, with 15.4%, and especially engineering, with only 8.5%, are the least represented in the survey. The group of doctoral and post-doctoral students makes up the majority of respondents, each with about 40%. Another 18.7% of respondents hold a (junior) professorship. At 50.9%, the proportion of male respondents is slightly higher than that of female respondents.

The detailed sample description can be found in the method report, which is available for download on the following page: https://doi.org/10.18452/26215

2. Scientific Goals, Expectations, and Scientific Practice

Scientists are confronted with multiple expectations and requirements, which they try to integrate into their scientific practice. For some selected scientific goals, we wanted to know, first, to what extent scientists share these goals at all, i.e., whether they regard them as genuine goals of science. Second, to what extent they feel pressure of expectation with respect to these goals. And third, with regard to the same goals, we wanted to know what priority the scientists ascribe to them in their own everyday work.

In qualitative interviews, which served as a preliminary study for the Berlin Science Survey, we asked scientists from various disciplines what they considered to be good research. Based on the answers, we compiled a list of goals in science. In pre-testing procedures, we then shortened this list to seven selectable, central goals.

The spectrum of goals in science to be evaluated now comprises a mixture of research-related intrinsic values ("methodological rigor" and "originality"), relevant topics of science policy discourse ("open science," "interdisciplinarity," and the societal usability of research results, also referred to as "societal impact" in this report), as well as other salient tasks and goals ("teaching" and "publication output").

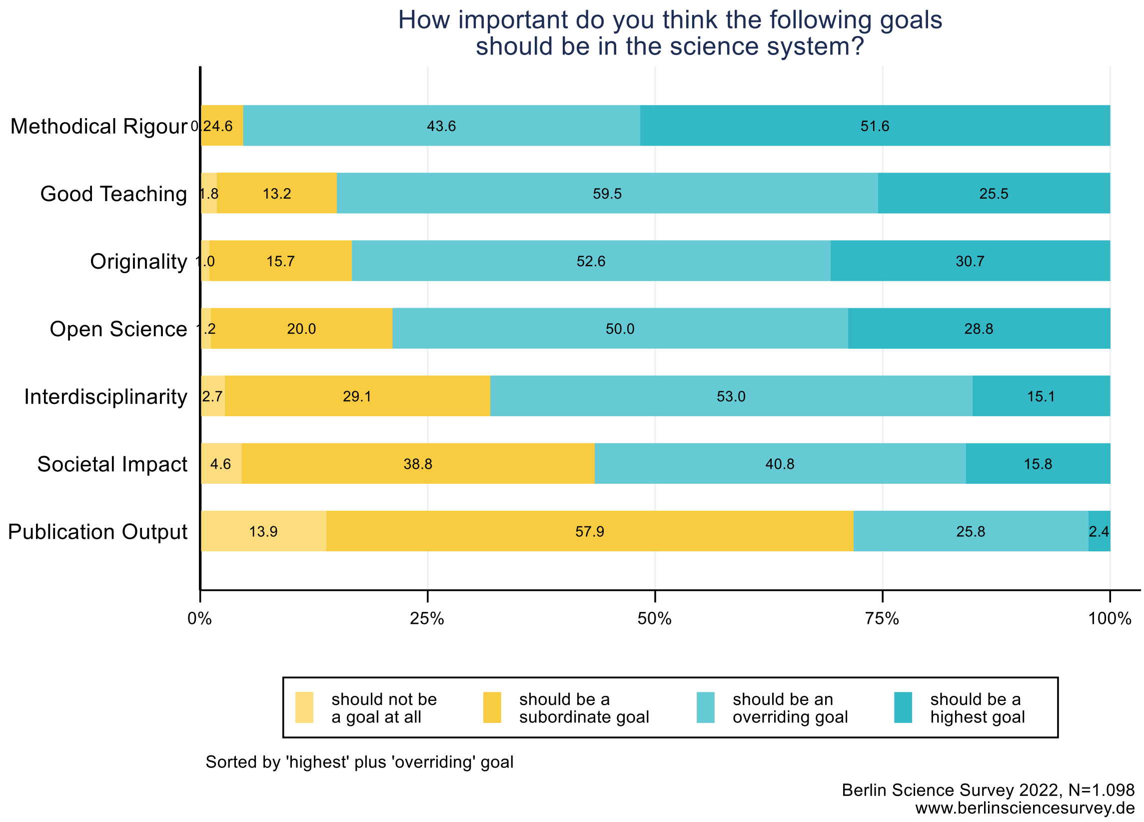

Figure 1 Goals of science

The results (Figure 1) show that the values intrinsic to research are regarded by the vast majority as superior or even supreme goals. It is interesting that "good teaching" as well as "open science" are similarly often perceived as important goals. "Open science" is thus much more strongly internalized as a scientific goal by the community than, for example, "interdisciplinarity" or "societal impact," although these goals, which are partly science policy goals brought in from the outside, also find quite broad approval.

Only the publication output should, in the opinion of the vast majority of scientists, not be an overriding or even the highest goal, but rather a subordinate one. In our view, this opinion expresses a clear resistance to incentive systems in the scientific system that are too one-sidedly oriented toward quantitative publication output. After all, resistance to this type of incentive system is still intensively debated, as shown, for example, by recent calls from the EU Commission[1] for a revision of the performance evaluation system in science. The contradiction between the scientists' attribution of relevance and external expectations with regard to publication output also becomes apparent when one contrasts the perceived pressure of expectations (Figure 2).

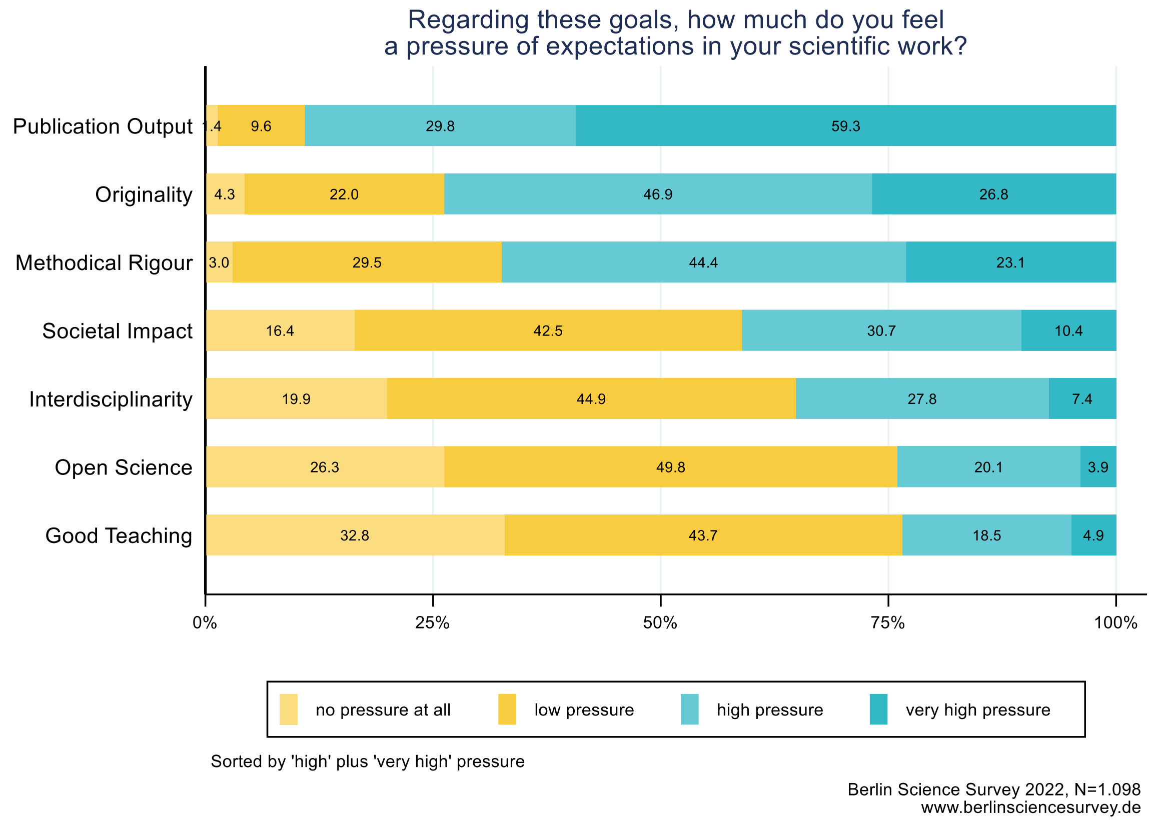

Figure 2 Pressure of expectations regarding these goals

The scientists perceive a very high pressure of expectations, especially with regard to publication output (see Figure 2). Most respondents also feel a high pressure with regard to the more research-immanent goals, originality and methodological rigor.

For all other goals, the pressure of expectation is rated by a clear majority as low or not present at all. Expectation pressure is felt least often with regard to "good teaching" and "open science." On the one hand, this is remarkable, since these dimensions were given a high priority in the normative

[1] European Commission, Directorate-General for Research and Innovation, *Towards a reform of the research assessment system: scoping report*, Publications Office, 2021, https://data.europa.eu/doi/10.2777/707440

assessment of the goals, but on the other hand, it is not surprising, since these aspects of scientific work have found little or no entry into the currently implemented evaluation systems.

But how do scientists prioritize their daily work in this field of tension among multiple requirements and goals? Figure 3 shows that, on the one hand, those goals are prioritized which the respondents themselves consider to be important goals for science: that is, the values "methodological rigor" and "originality," which are intrinsic to research. On the other hand, goals are also strongly prioritized that are subject to the highest pressure of expectations, i.e., "publication output".

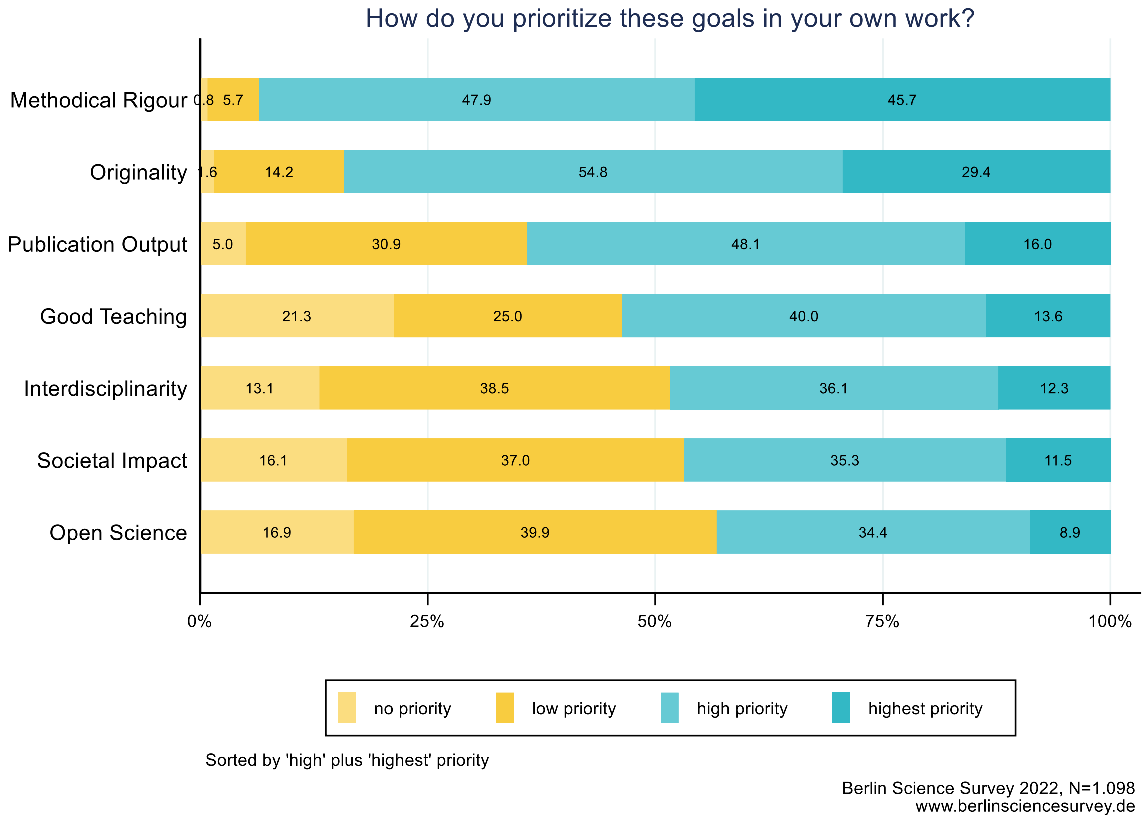

Figure 3 Prioritization of goals in own work

In this respect, it cannot be assumed at first glance that external expectations and objectives have a negative influence on research quality, as is often assumed: Although the pressure of expectations coming from outside, as in the case of "publication output," is obviously very high, on the other hand the scientists weigh this against their own normative objectives. Prioritization is thus given not at the expense of research quality, but rather at the expense of secondary goals that are not associated with too much pressure of expectations.

"Good teaching" also has a high priority for many scientists, although just under a third give "no priority at all" to good teaching, although it must be qualified here that scientists were also surveyed who may not be actively involved in teaching. Since this goal is not associated with high pressure of expectations in science, we conclude that for most of them the intrinsic motivation to achieve the goal is high.

The science policy goals "interdisciplinarity," "societal impact," and "open science" are in the last place of prioritization among the scientists. This could change in the coming years if the pressure of expectations increases in this regard, or if the scientists' own normative objectives shift accordingly.

3. Cooperation

When it comes to collaboration in science, one often only looks at collaborative research projects. However, it is not uncommon to find cooperation in other activities as well, as Figure 4 illustrates.

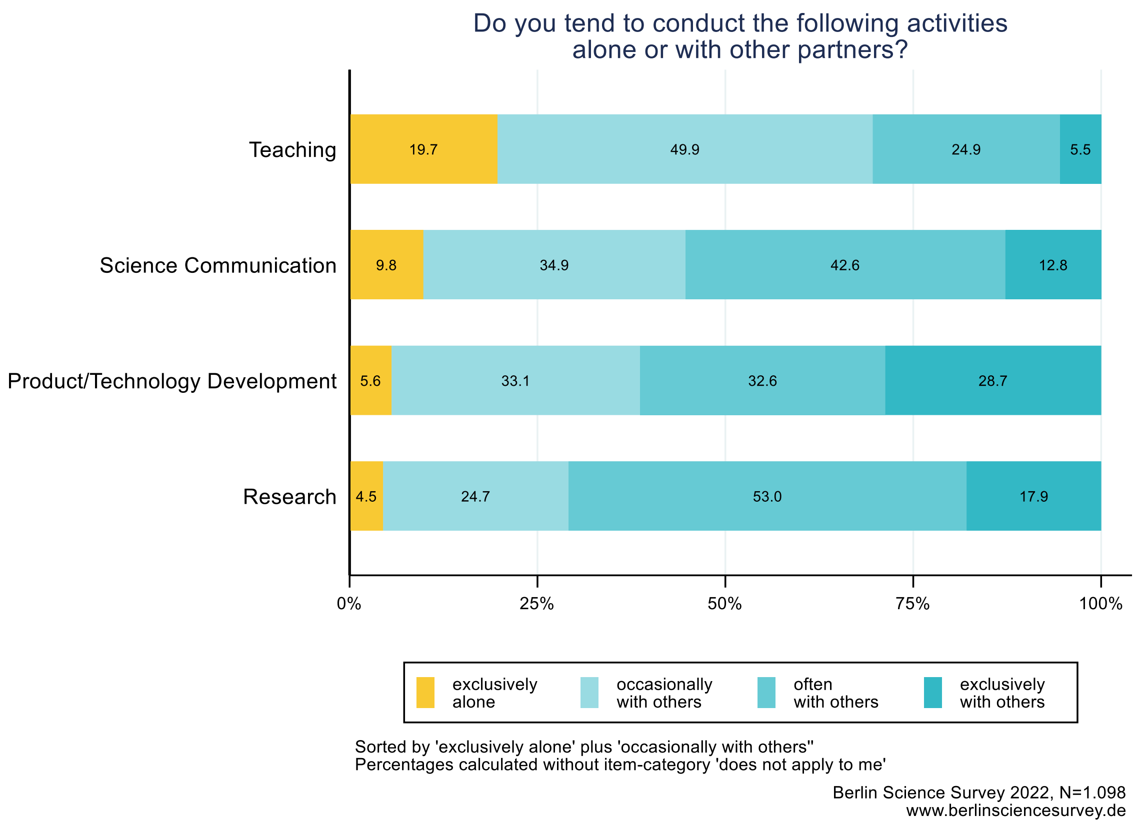

Figure 4 Cooperation in various activities

Nevertheless, cooperation is most common in research: More than 70% state that they frequently or even exclusively conduct research with others. Only 4.5% state that they conduct research exclusively on their own. On the other hand, even for teaching, only one-fifth of respondents say they do it exclusively on their own.

If we look at how often the scientists work with certain groups of people (see Figure 5), we see that, as expected, a large proportion of respondents work regularly (i.e., often, very often, or always) with colleagues from their own discipline (80.7%). Interdisciplinary work is still a common practice for 49.8% of the respondents. With regard to transdisciplinary work, i.e., working with non-scientists or persons outside of academia, only 18.5% of the respondents stated that they do this regularly.

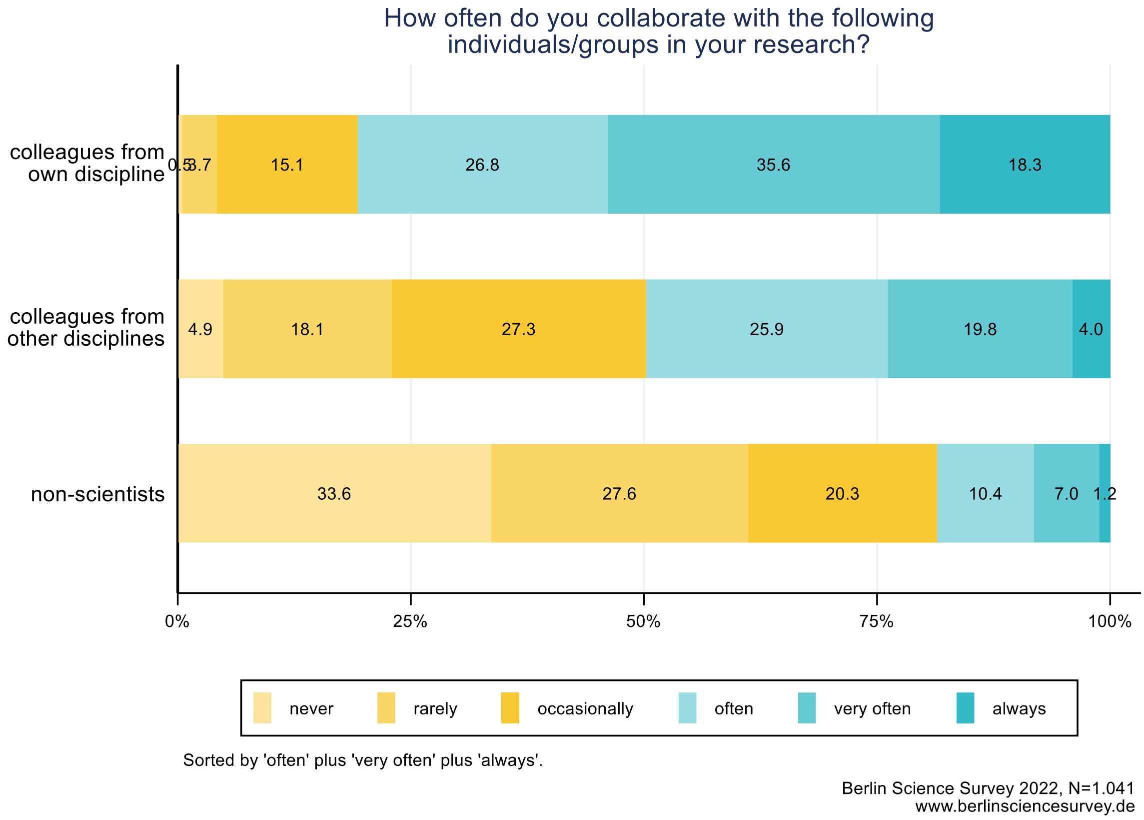

Figure 5 Frequency of intra-, inter-, and transdisciplinary work

For collaboration specifically in the area of "research," we asked scientists more specifically about their collaborative partners (see Figure 6). Of those who cooperate, the vast majority say they do so with other researchers from their own field of work or team (86%) or from their own university (71%). 41% cooperate with other universities in Berlin, 59% with other universities in Germany and 55% with universities abroad.

Collaboration with non-university research institutions is also widespread among respondents (47%). Of these, just under a third are research collaboration projects with a research institution from the Berlin research landscape.

At 27%, research collaboration with companies is somewhat less common. This is certainly not least because companies are not equally relevant for all scientific areas. Nevertheless, just under 14% of respondents cooperate with companies from the Berlin research landscape.

The least frequent research collaboration projects are with universities of applied sciences (6%). Collaboration is more frequent with civil society actors and organizations, such as foundations, associations, NGOs, and citizens (15%).

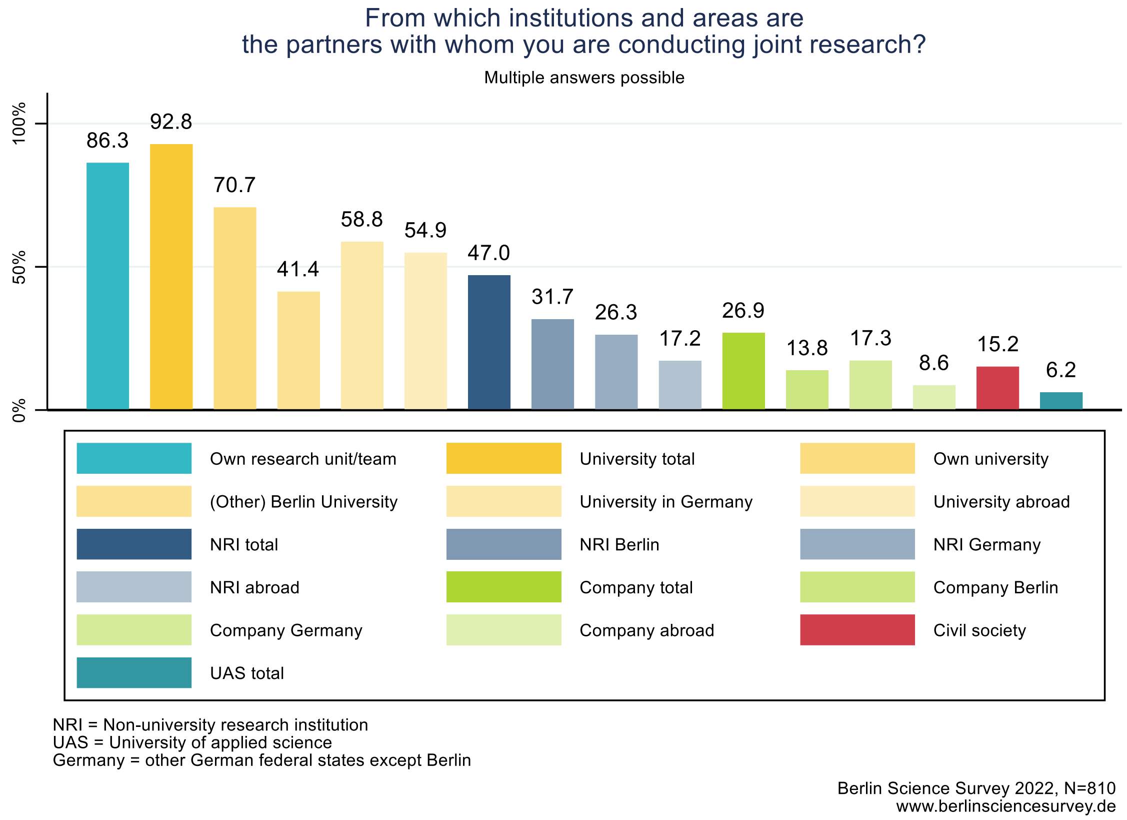

Figure 6 Cooperation partners

How much cooperation is good and desirable cannot be deduced from these figures. It is even less possible to deduce whether there is a need for more cooperative relationships. These questions require a more in-depth look at the specific cooperation needs of scientists. Data on this were also collected as part of the survey. We will provide the corresponding analyses at a later date.

When asked about what works well and what works less well in collaboration projects, the scientists describe their own experiences as overwhelmingly positive (see Figure 7). It should be emphasized here that the "hard" conditions for success – "meeting project objectives" and "meeting own objectives" – were rated as functioning very poorly or rather poorly by very few respondents and as functioning rather well or very well by the vast majority. It is very positive to note that the trust between the cooperation partners, as a fundamental condition for cooperation in general, is rated extremely highly by the respondents.

It is also noteworthy that the integration of different professional perspectives ("interdisciplinarity") also presents few difficulties. Difficulties are most likely to be found in the division of labor, the distribution of funds and resources, and the integration of different working styles.

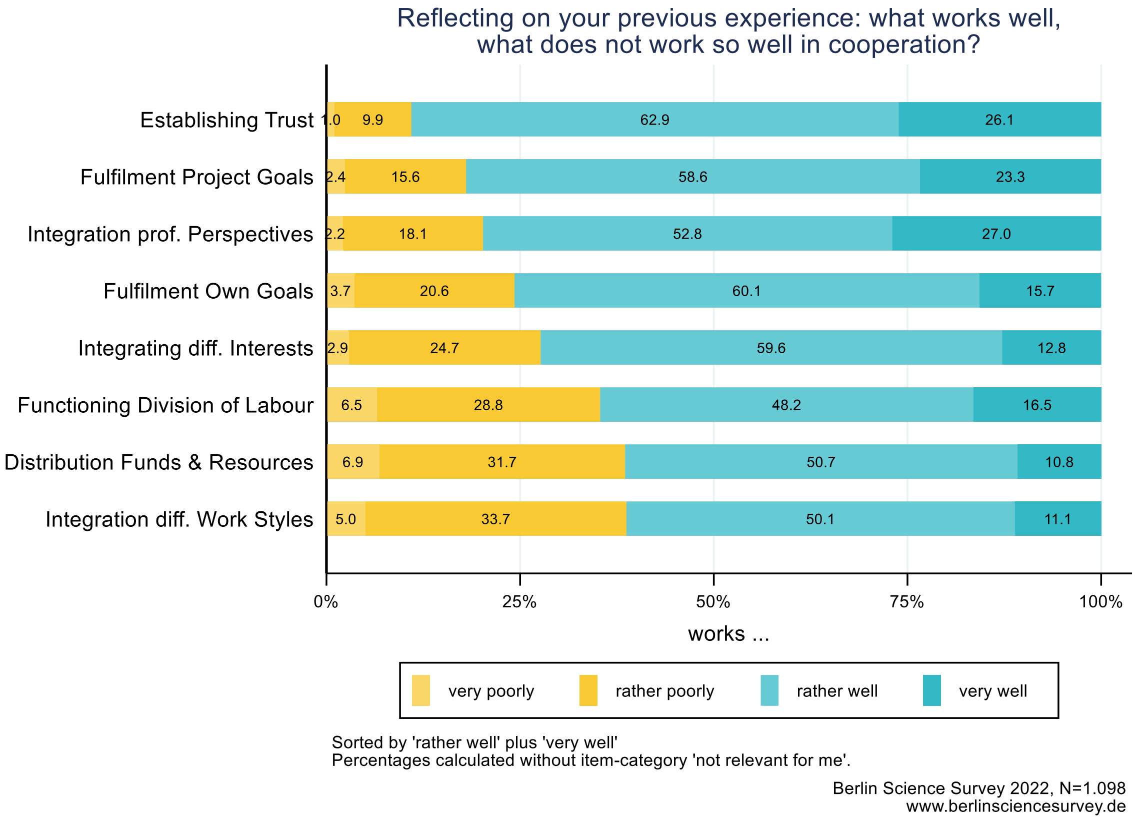

Figure 7 Evaluation of cooperative relationships

Overall, this overview of cooperative relationships shows that there is no urgent need for improvement in this area across the board. It should be borne in mind, however, that only people who maintain cooperative relationships were surveyed. It may well be that more in-depth analyses show that there is a need for support in initiating collaborative relationships. This is also indicated by Figure 17.

4. Open Science

The term open science is used to describe various practices that aim to increase the accessibility, comprehensibility, and reusability of scientific findings and results in the broadest sense. In the Berlin Science Survey, the degree of dissemination of these practices is surveyed in order to be able to determine trends over time, but also to identify difficulties.

In the evaluation of goals in science, we were able to determine that open science as a goal in science occupies a middle position in comparison to the other goals to be assessed (see Figure 1), but that the pressure of expectations is perceived to be the lowest here, together with "good teaching" (see Figure 2), and consequently, for the majority of researchers, open science falls to last place in the prioritization of the goals that were compared in the Berlin Science Survey (see Figure 3).

If we ask how important scientists consider the expansion of open science for science as a whole, we find that more than 95% consider it important (see Figure 8).

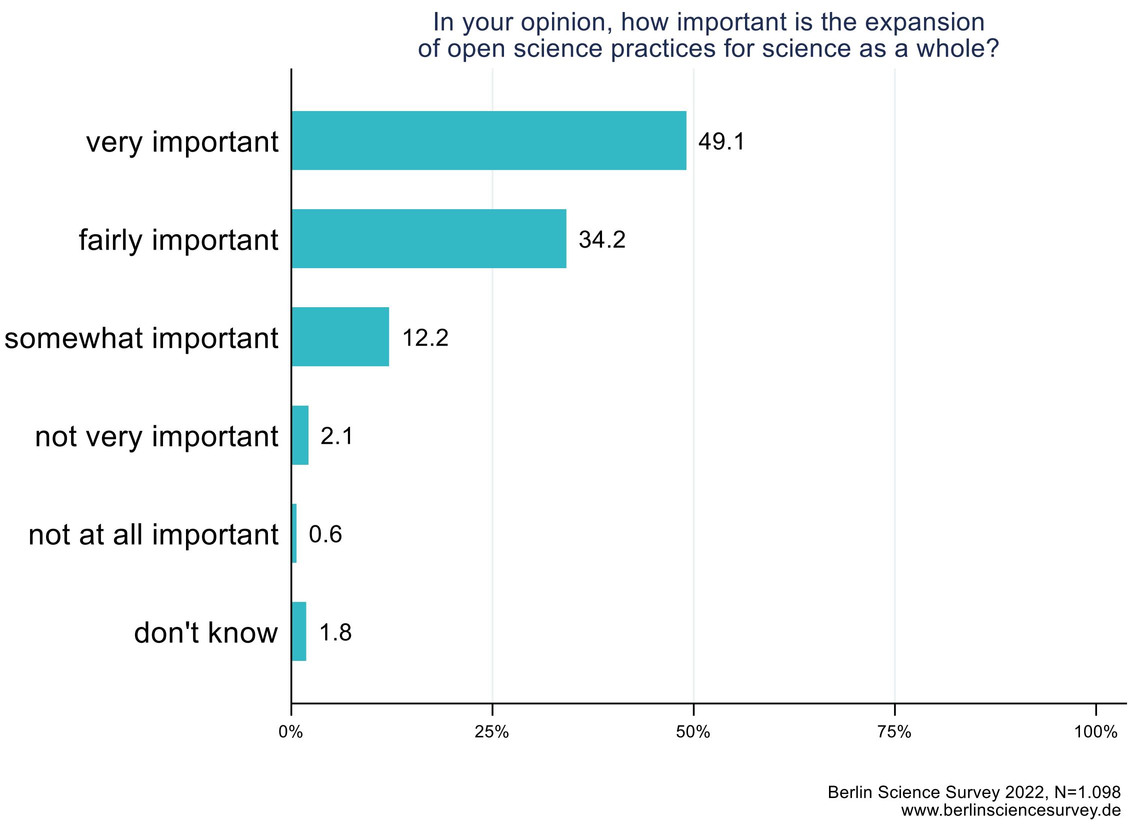

Figure 8 Importance of expanding open science

So open science does not have an image problem, but the question is whether open science has an implementation problem. To this end, we look below at the results on how widespread open science practices are.

We asked the scientists how established various open science practices are in their everyday research. It is already known from studies on open science that the most widespread open science practice is open access publishing, i.e., the public and free provision of scientific publications. Here, too, this practice is well established: On average, the scientists state that a good 55% of their publications are available free of charge on the Internet (Figure 9).

Overall, the differences among the disciplines are not extraordinarily large, and even in the humanities, where open access is least widespread, a good 46% of publications are freely accessible. However, the natural sciences lead the way in open access publishing, with over 63% of publications being freely accessible and free of charge. This is not surprising, as the natural sciences already have a long tradition in this area with open science repositories such as arXiv.

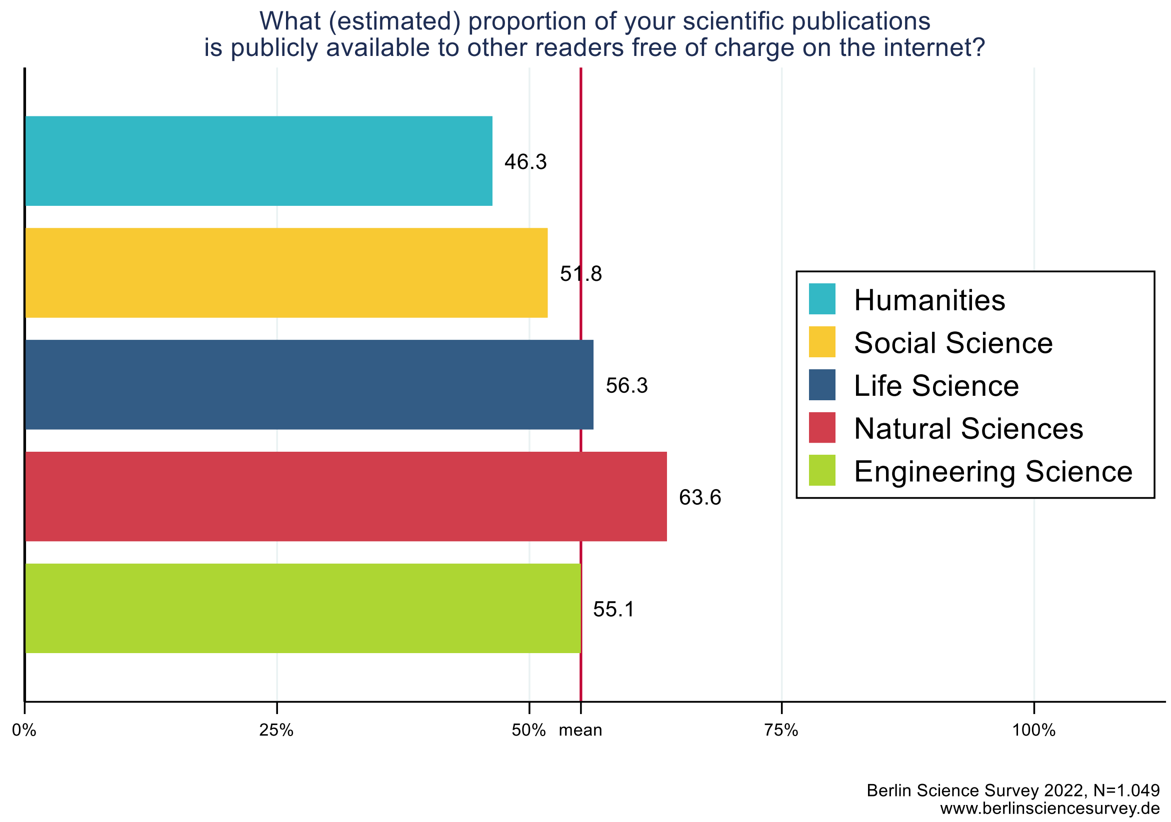

Figure 9 Shares of open access publications by subject groups

Of those who publish open access papers, we asked which of the three most common routes – Gold, Green, or Hybrid Open Access – they use to make their publications available.

Gold Open Access includes all electronic first publications in journals that are free and open access (open access journals). Green Open Access includes all electronic second publications in freely accessible institutional or specialist online archives or repositories, or on websites (referred to as pre- or postprints). Hybrid Open Access, on the other hand, involves making articles freely available to the readership in otherwise paid journals in return for the author and/or sponsor paying a fee.

The average of all scientists shows that the golden path of publishing in a "real" open access journal predominates with 51%. The green path of pre- or secondary publication is taken by 39% of respondents, and the hybrid path is also taken by a good third of respondents (not shown).

However, these average values do conceal differences specific to subject groups (see Figure 10). While the engineering sciences prioritize the Green Route, the Gold Route is dominant in all other subject groups and especially in the life sciences. They, on the other hand, use the Green Route less frequently (only a good 27% of the time). The Hybrid Open Access format is used least frequently by the humanities, at 23.5%. This may also be due to financial reasons, as the DFG funding program for financing open access publications explicitly excludes Hybrid Open Access. Overall, significant dynamics can be expected in the area of open access in the coming years, both on the part of researchers and their institutions due to control policy measures, but also on the part of publishers due to funding issues and developments in contracting between universities and publishers.

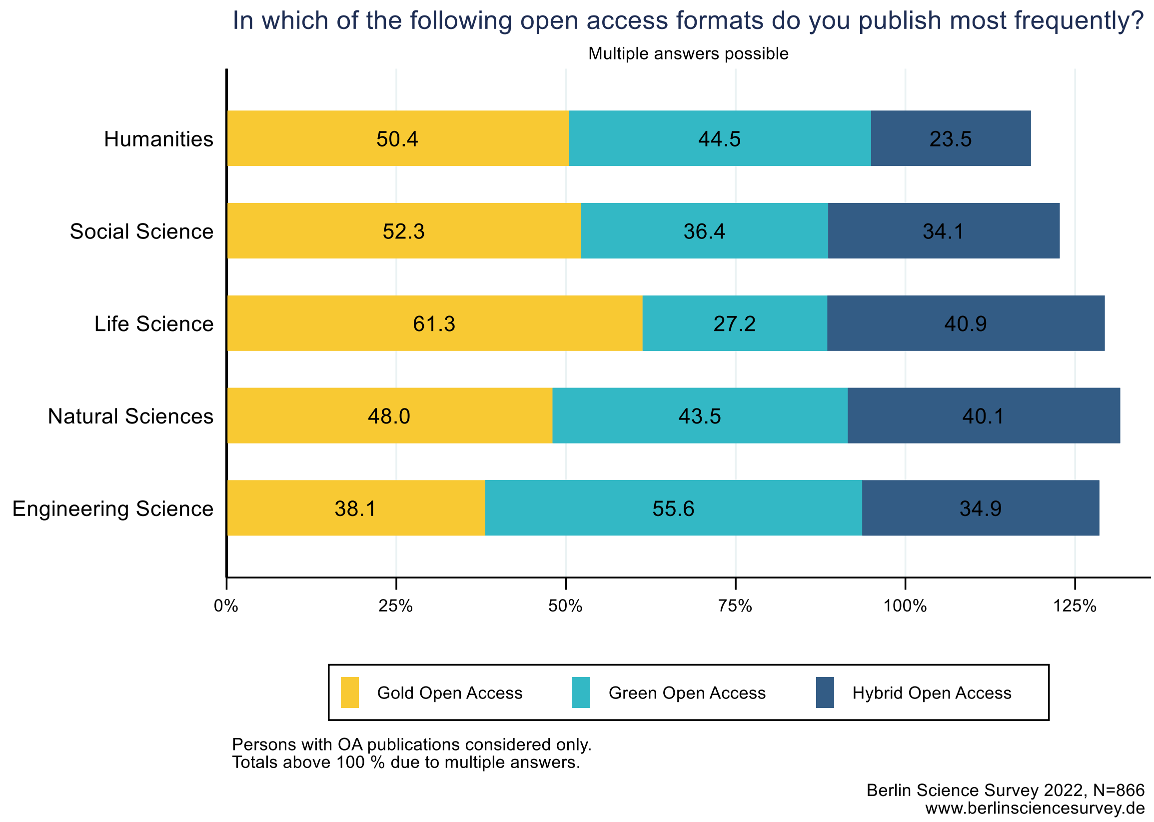

Figure 10 Frequency of use of different open access formats

Other open science (OS) practices are much less widespread than open access publishing and, moreover, are not relevant in all research contexts (see Figure 11). We assume that open science practices have become routine in respondents' research realities when respondents indicate that they use the practice "often," "very often," or "always."

Making data from one's own research publicly available and free of charge, i.e., data sharing, has become routine in this sense for 26.8% of respondents and is thus the most common of these OS practices.

Code and material sharing, i.e. making study-relevant material from one's own research (code, questionnaires, blueprints, etc.) available publicly and free of charge, has already become part of everyday research for 26.7% of the scientists surveyed.

The inclusion of citizens and/or civil society actors in one's own research (also referred to as "citizen science" in this report) is practiced regularly by only 10.6% of the respondents, whereby the proportion of those who do not consider this practice relevant for their own research is particularly high at 24.7%. The open peer review process has already become routine for 21.2% of respondents.

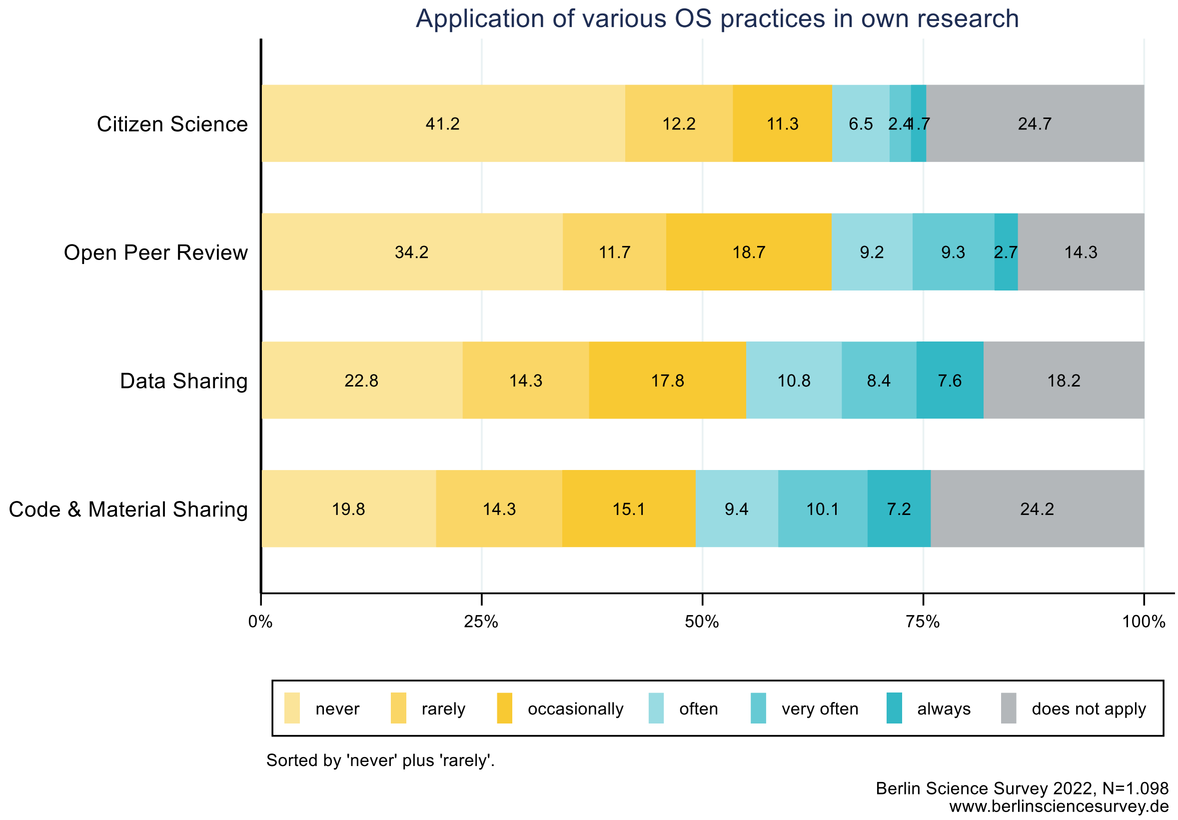

Figure 11 Frequency of application of open science practices

The data on the prevalence of OS practices confirm the suspicion that while OS does not have an image problem, it does have an implementation problem. Despite the high importance given to OS by the scientists, the implementation of OS in the daily research routine of the scientists is given the lowest priority. Low expectations and incentives are probably responsible for this low prioritization in combination with competing goals that are linked to stronger incentives. This could be exacerbated by additional hurdles to implementing open science. We therefore asked to what extent difficulties were seen in implementing each OS practice. Here, all individuals were asked about all practices, regardless of whether they considered them relevant to their own research practice or not.

Figure 12 shows different patterns for the different practices, which are the reason for the rather low prevalence of these practices: While the majority (41.8%) say that they cannot even assess the difficulties in implementation in the case of citizen science, just under 41% of respondents see great or very great difficulties in making data available. This shows that the open science practices themselves are prioritized very differently. More scientists are able to assess the difficulties in implementing open data than in citizen science, which suggests a higher relevance or a higher need for data sharing.

As we have already reported, open access provides a counterpoint to this because it is now considered to be quite established. Accordingly, 68.8% also see no or only minor difficulties in implementation.

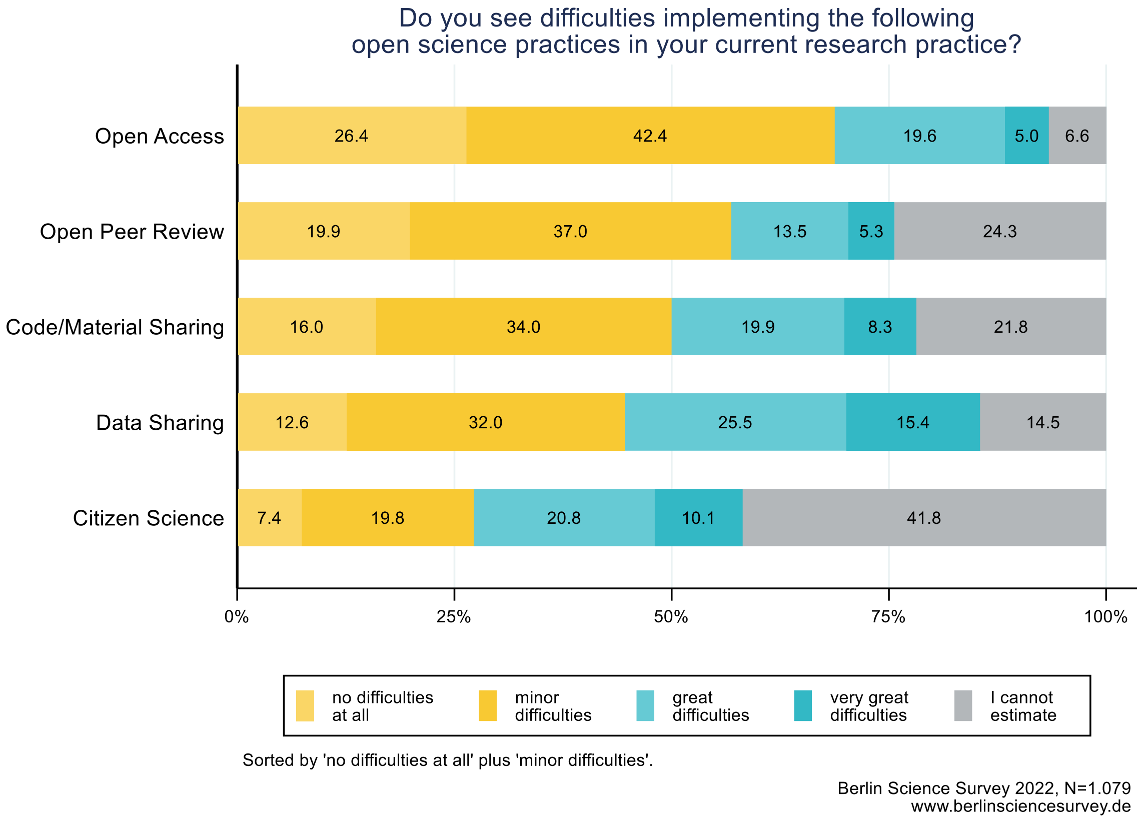

Figure 12 Difficulties in implementing open science practices

5. Knowledge Exchange

Knowledge transfer or the need to generate "societal impact" is one of the most strongly pushed science policy goals. The products and findings of scientific work should demonstrate their added value for society.

However, the potential for knowledge transfer can vary greatly depending on the specific object of knowledge. The possible addressees of knowledge transfer processes also vary depending on the object of knowledge. This diversity in the sciences can be approached by looking at the differences between the disciplines. In the Berlin Science Survey, scientists were asked to assess the areas outside science for which the knowledge they produce is relevant. This reveals – in part expected – differences between the subject groups, but also findings on the topic of knowledge transfer across these boundaries (see Figure 13).

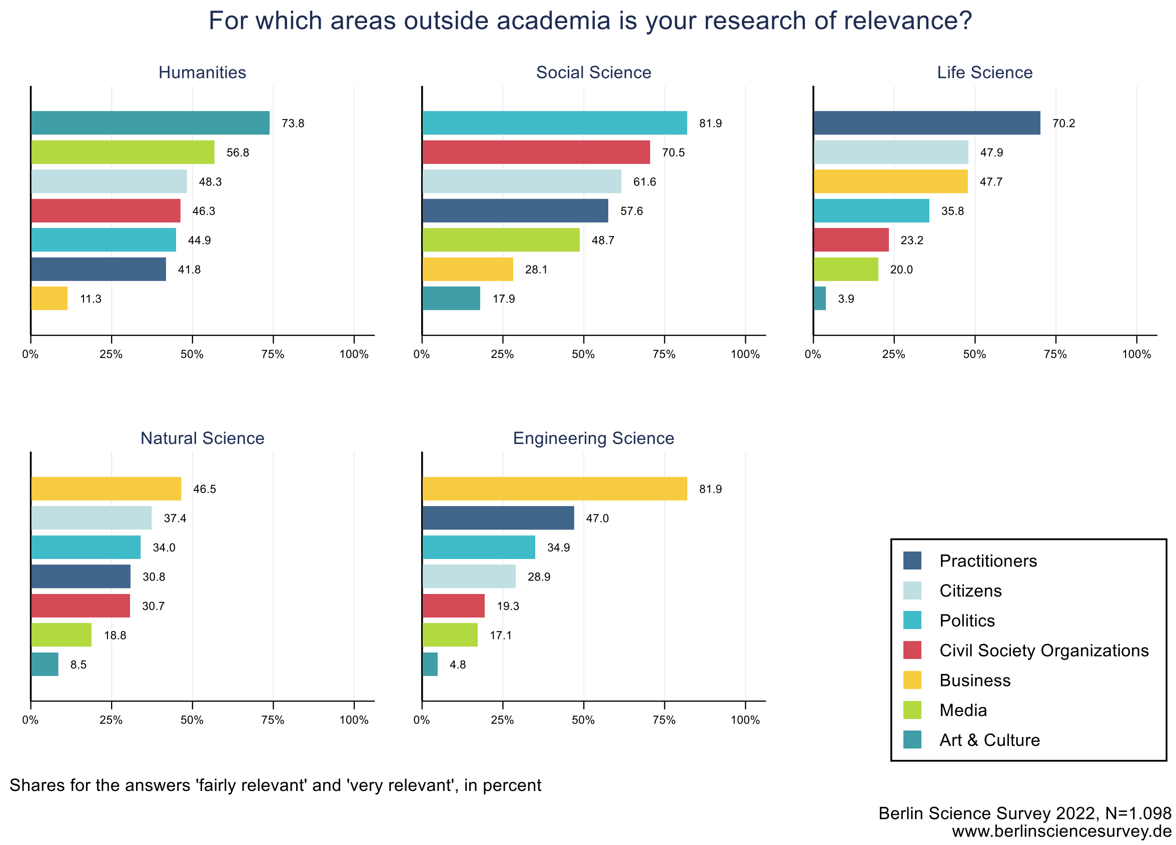

Figure 13 Relevance of own research for other areas, by subject groups

Humanities scholars emphasize the importance of their research for art and culture as well as for the media. In contrast, only a few humanities scholars believe their research is relevant for the economy. The knowledge products of social scientists are primarily considered significant for politics and civil society actors.

In the life sciences (including medicine), the relevance for the group of practitioners predominates. This includes medical professionals, technicians, and teachers. It should be noted that the term "practitioners" can focus on different groups of people depending on the subject group.

Natural scientists, like engineers, most frequently see opportunities for utilization in the economy, followed closely by the group of citizens in the natural sciences.

It remains to be noted that the relevance of one's own research for various non-scientific areas of society varies depending on the subject group, but is rated quite highly overall. Across all subject groups, only a few respondents state that their research is not relevant to any of the areas (12.7%, not shown). Only among natural scientists is the proportion somewhat higher, at 26%, which is probably due to a stronger orientation toward basic research.

Since the majority of respondents see the relevance of their own research for various areas of society, the question then arises as to the extent to which there is already an exchange with these groups.

Just under one-third of respondents said they were in contact with the art/culture and politics sectors and with citizens (see Figure 14). For the other social groups, the proportion of reported exchanges is even higher. Scientists are most frequently in contact with practitioners, with 61.6% of the researchers surveyed reporting such contacts.

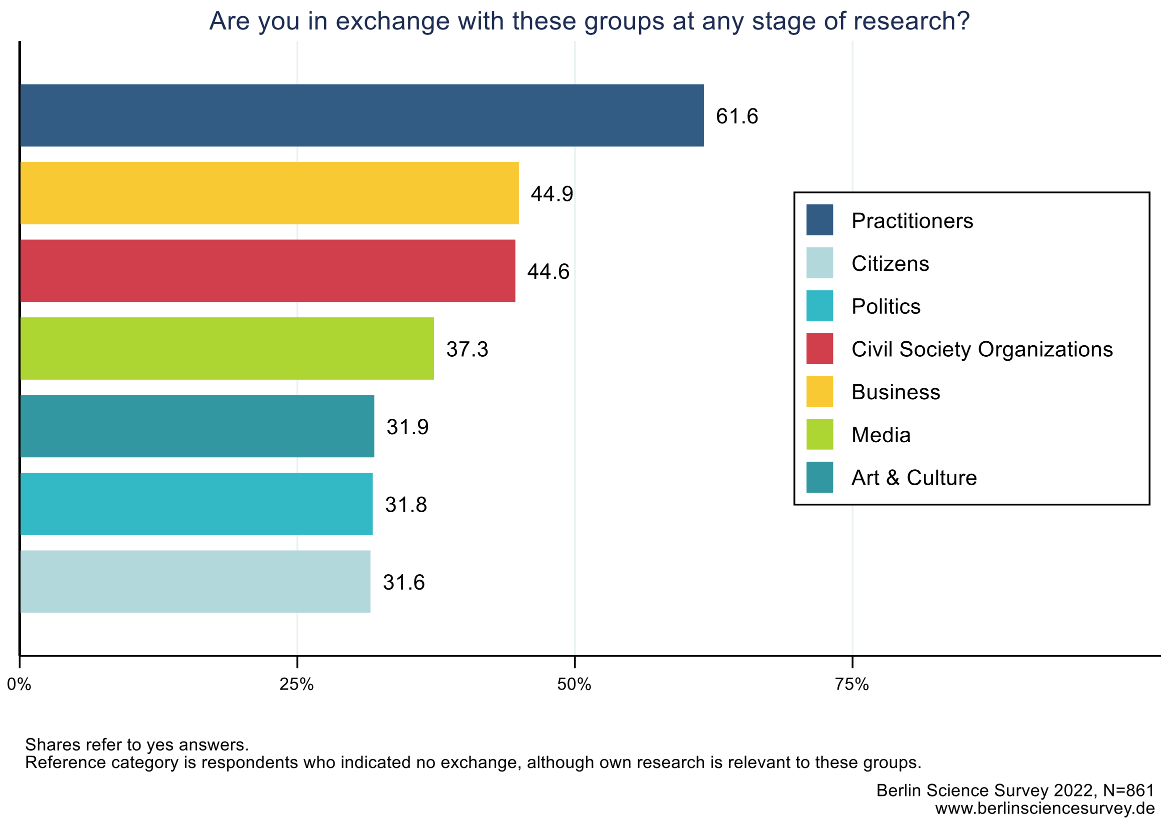

Figure 14 Exchange with other groups / areas

In conclusion, it can be stated that, on the one hand, dialogue does not take place everywhere where research is considered relevant for certain areas. On the other hand, we also are far from "research in the ivory tower," as exchange with relevant interest groups is relatively widespread.

6. Berlin Research Area & Role of the Berlin University Alliance

A central goal of the Berlin Science Survey is observing dynamics and changes in the Berlin research landscape that may be caused or at least influenced by science organizations such as BUA or BR50.

In order to assess the Berlin research landscape from the scientists' point of view, they were asked to make statements on several central dimensions. Overall, the researchers' assessments are very positive (Figure 15). In particular, the research-related dimensions, i.e., research quality, internationality, cooperativeness, research autonomy, and innovation potential, are rated by a large majority as "rather good" or even "very good. " The assessments of the general conditions – personnel resources and material conditions – are more critical. These critical assessments should be a reason to enter into discussion with the university administrations in order to identify potentials and possibilities for improvement.

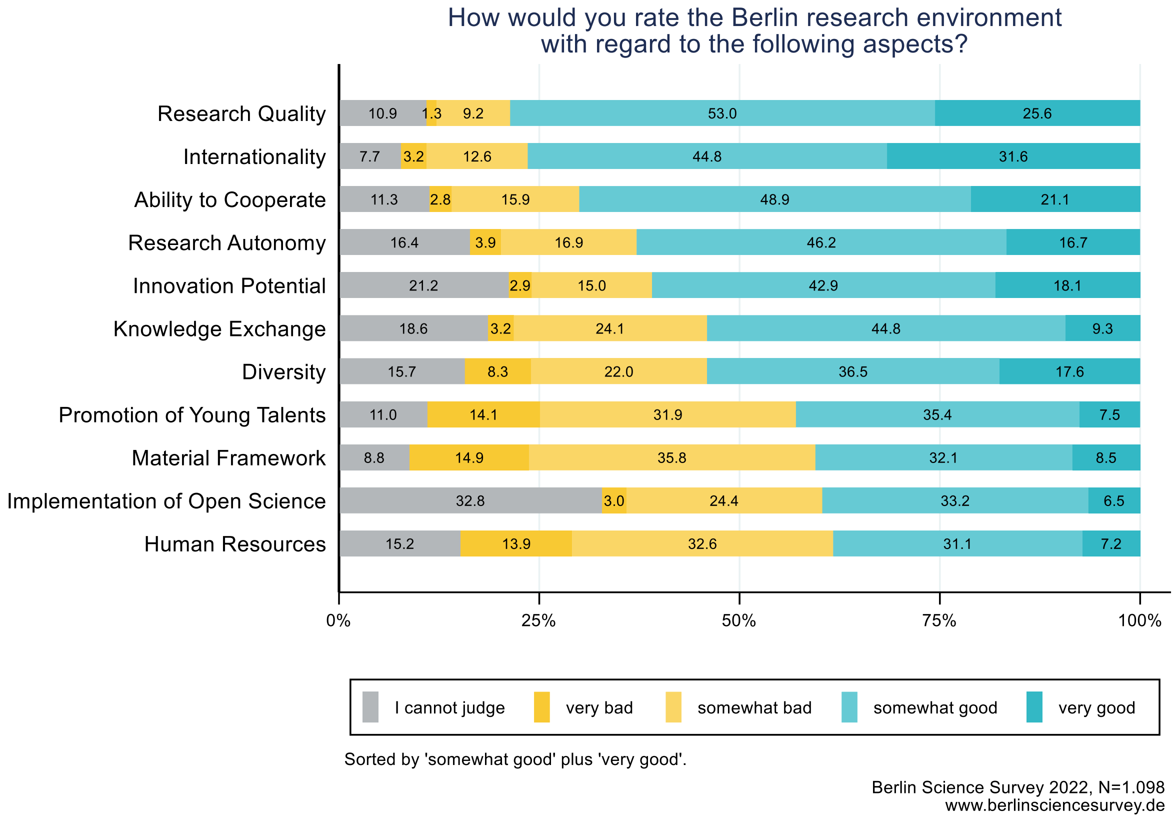

Figure 15 Assessment of the Berlin Research Landscape

In Section 4, we looked at the topic of open science in detail. Overall, the scientists attribute great importance to this area, whereby contradictions between claims and reality were revealed. Now, the scientists' assessment of the implementation of open science in the Berlin research landscape also points to a need for improvement. It should also be emphasized here that a full 32.8% of respondents are unable to assess the implementation of open science. Against this background, the fact that BUA is currently working on the development of an open science strategy seems relevant and timely. The goals of knowledge transfer, diversity, and promotion of young researchers, which have been staked out as key topics by BUA, also fall behind the purely research-related dimensions in the evaluation. Of these, the promotion of young researchers scores the lowest. Thus, BUA's objectives can be seen as reasonable in these areas as well.

With regard to the overall framework conditions under which scientists conduct research in the Berlin research landscape, they express satisfaction in the middle of the scale (mean value = 5.5 on a scale from 0 = very dissatisfied to 10 = very satisfied). There is apparently still "room for improvement" here (see Figure 16).

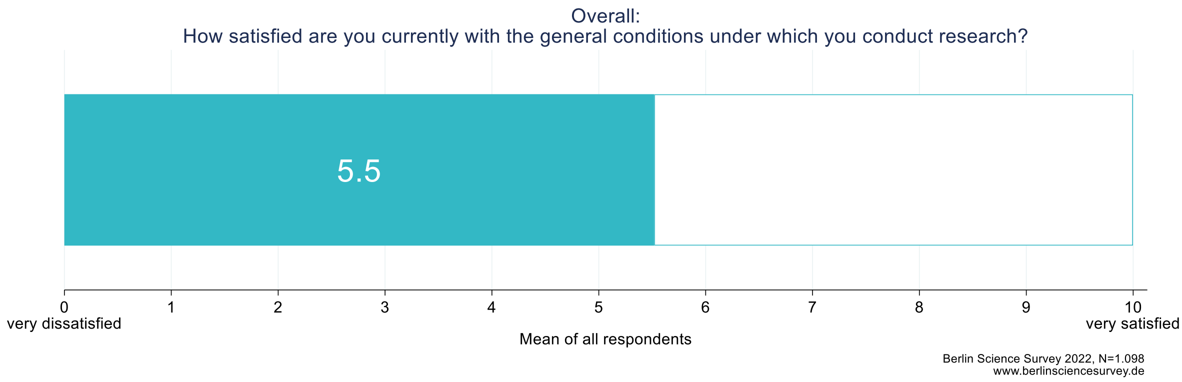

Figure 16 16 Satisfaction with general own research conditions

When dissatisfactions or difficulties come up, the question arises as to the extent to which the facilities can contribute to solving problems or overcoming difficulties.

Organizational support for knowledge transfer activities is most frequently desired, at 40.4% (see Figure 17). It is conceivable here that initiating exchanges with relevant groups outside of science could be of particular interest, as we were able to identify a discrepancy here (see Section 5). However, a need for support in implementing open science, in initiating collaboration and in ensuring research quality is also indicated by more than one-third of the respondents in each case.

In the case of open science, the need for support could take the form of identifying the relevance of various open science practices for one's own research practice and eliminating difficulties in realizing them. In order to offer targeted support for collaboration initiatives, it would be important to learn what difficulties those who do not collaborate perceive. This would have to be surveyed in a follow-up wave. In order to support the topic of ensuring research quality with meaningful measures, it would also be necessary to find out what concrete difficulties the respondents face in this regard. This question could also be taken up in a later wave of the survey.

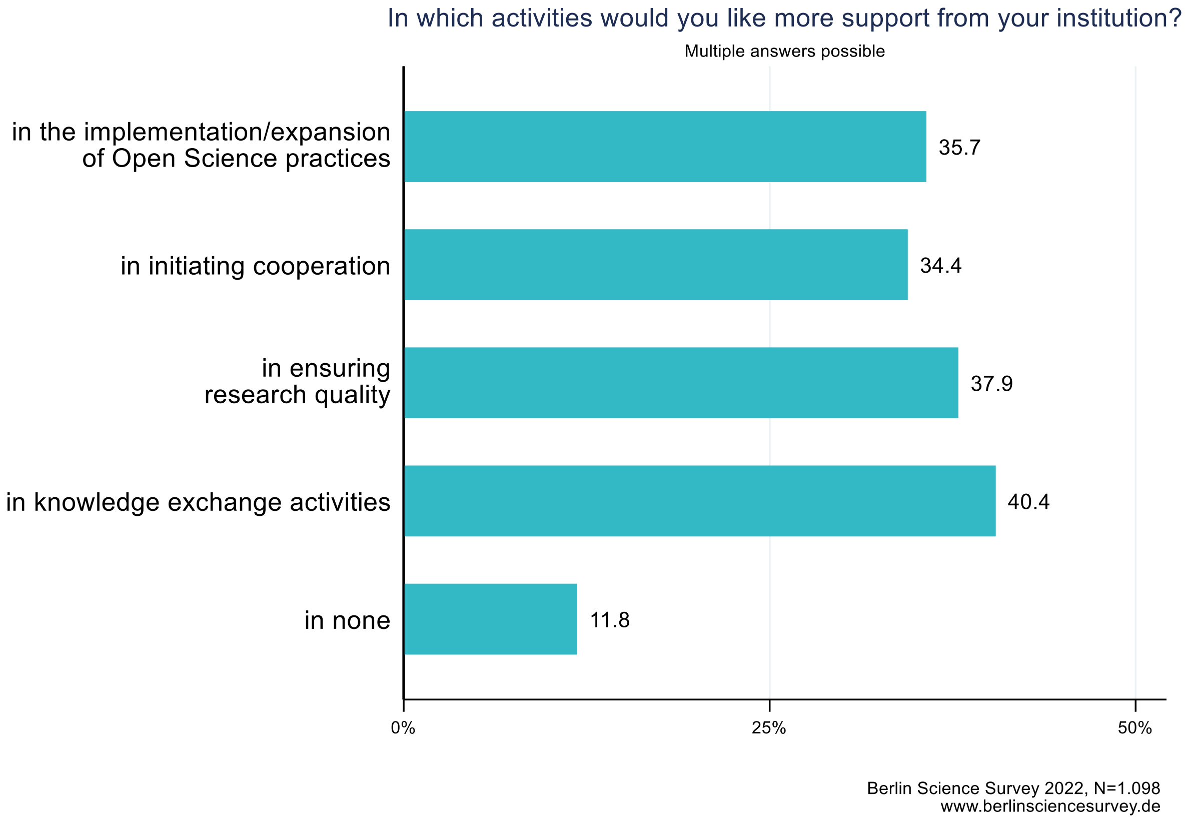

Figure 17 Support needs by the institutions

When it comes to the Berlin research area, we are naturally also interested in how BUA's role is perceived there. The BUA aims to be a driving force in the development of the Berlin research landscape into an integrated and internationally renowned science location. To this end, various sub-goals have been defined, such as the promotion of innovation and internationality. It is therefore interesting to hear the views of scientists in the Berlin research landscape on the extent to which BUA is on track to achieve these goals. Furthermore, it should be assessed whether BUA as a supra-organization increases the visibility of the Berlin research landscape. This question is justified and relevant in light of the fact that BUA's goal is to elevate the Berlin research landscape to an internationally leading science location.

First of all, it is noteworthy that a quarter to a third of the respondents at the time of the survey, i.e. two years after the founding of the BUA, do not yet want to or cannot allow themselves to make a sufficient judgment (see Figure 18). Among the others, a slightly positive picture prevails. The statement that BUA contributes to making the Berlin research landscape as a whole more visible receives the strongest approval. The question of whether the BUA contributes to making the Berlin research landscape more innovative or more international cannot currently be answered clearly. In the pilot study, the assessments are balanced. At the same time, however, this means that more efforts are needed to convince scientists of the added value of BUA.

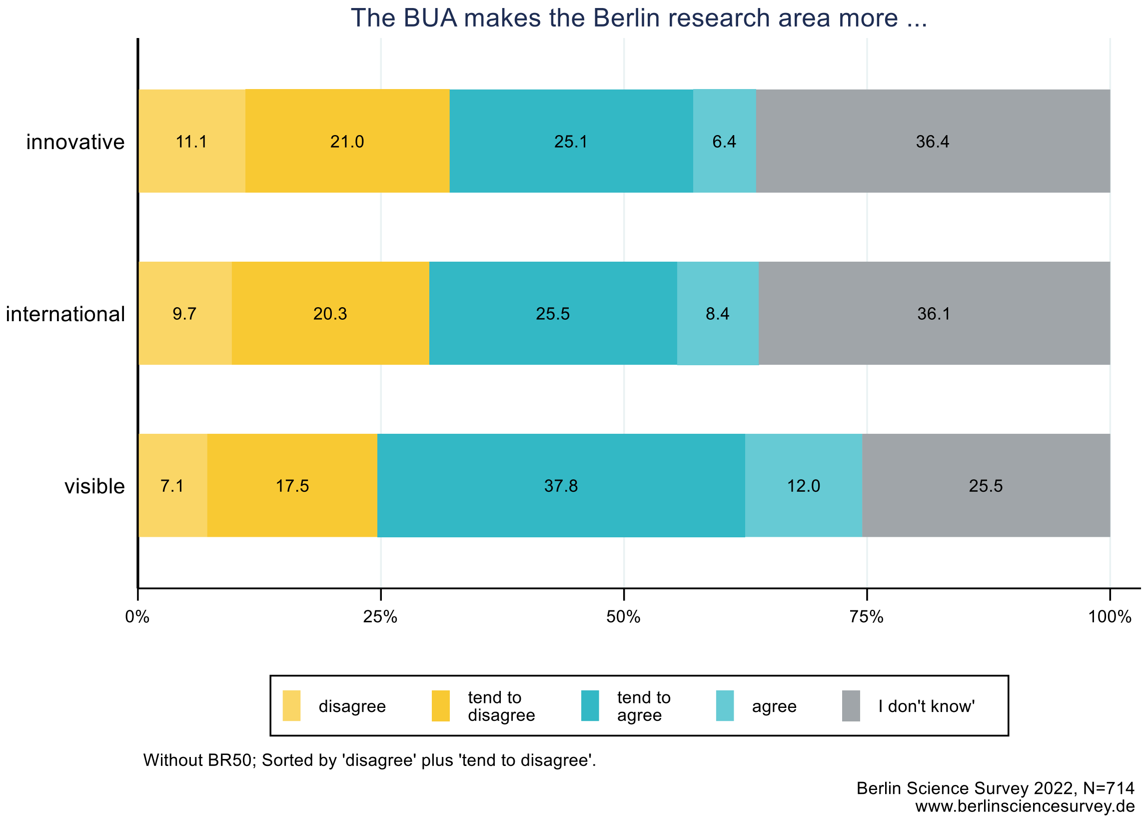

Figure 18 BUA image

In order to be able to classify the assessments of BUA and, above all, the opinions expressed, it is worth taking a look at the extent to which the respondents themselves are involved in BUA activities.

Overall, BUA is well-known among the researchers (see Figure 19). Only a few (15.5%) have never heard of BUA. The majority (55.4%) occasionally hear something about BUA but are not actively involved in it. Just under one-fifth of respondents have attended BUA events.

These results suggest that it should continue to be BUA's task to become more visible in the research space, to integrate people into BUA's activities, and, most importantly, to have an impact where scientists appreciate it.

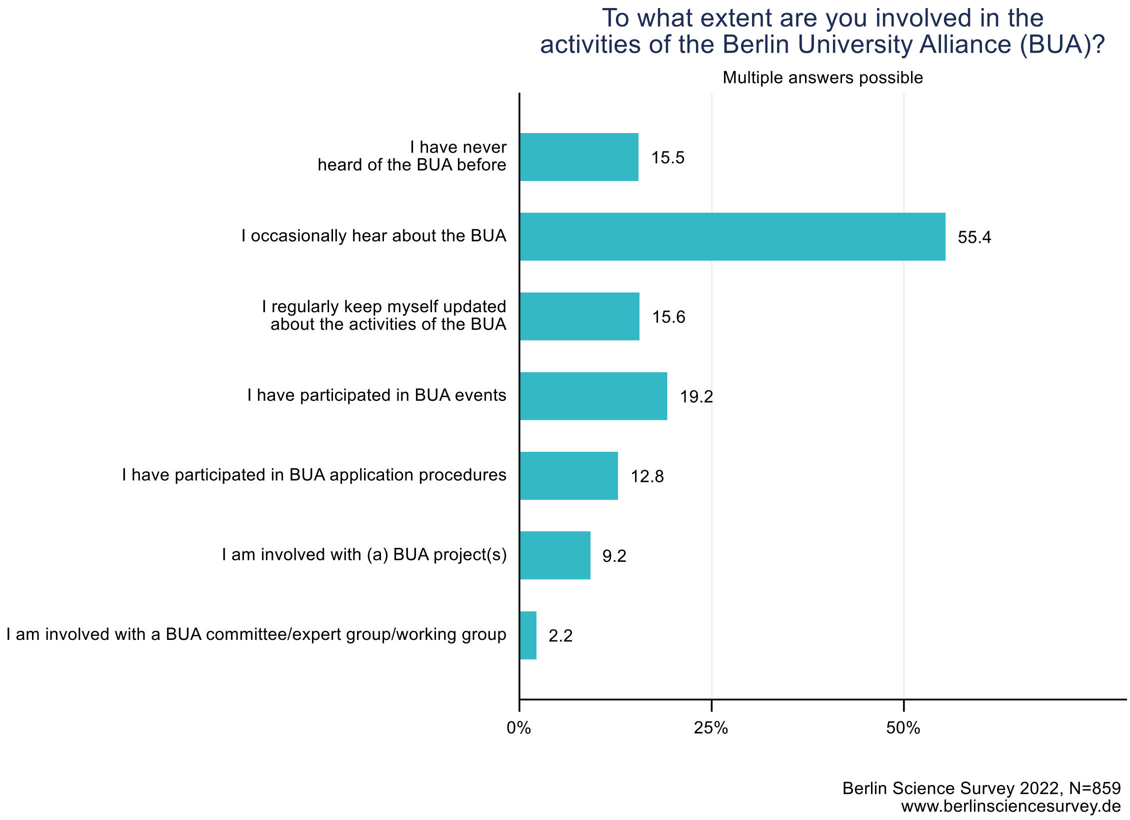

Figure 19 BUA involvement

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