

# Survey on open science attitudes and experiences among Serbian scholars



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WP1 - Mapping the Current Open Science Potentials at Serbian Universities

P3 - Mapping the situation regarding the awareness and knowledge  
of open science principles within academic community

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## Introduction

Unrestricted access to scientific information has become the main impetus and precondition for development of knowledge-based society. Open science principles are recognized as a priority within the future European Research Area that should provide better circulation of research results within academia and society. Promotion of these principles among various stakeholders is not only a mean to foster the exchange of ideas, but also a mechanism to make science itself more responsible, more responsive, and more efficient. This is particularly relevant for small and developing economies such as Serbian, in order to improve the accountability and effectiveness of publicly-funded research and foster the engagement of the industry and wider society in science.

The implementation of open science principles in Serbian academic community is still at its embryonic stage. Currently there is no clearly defined strategy or a policy regarding open science at the national level, apart from the rules that define the obligation to deposit PhD theses defended at Serbian universities in publicly available institutional repositories. Current research evaluation rules, as well as promotion and tenure requirements, strongly encourage authors to publish their papers in prestigious international journals that are almost exclusively subscription-based. On the other hand, publishing model of the majority of Serbian journals could be described as *platinum open access*, which means that neither subscription nor article processing fees are charged. In such a situation, Serbian researchers are not always aware of various modalities of knowledge dissemination and possibilities to make their research output more visible and accessible. Furthermore, a considerable number of papers by Serbian authors in the past few years have appeared in so-called "predatory" journals and other publications of dubious quality, thus raising an issue about the common perceptions and possible misperceptions of the open access idea.

The main aim of the BE-OPEN project is to foster the implementation of open science principles at Serbian universities. In order to achieve this goal, three prerequisites must be met. The first is establishing a set of policies and guidelines at the national and institutional levels. The second is building a network of institutional repositories and a proper infrastructure to comply with those policies as well as the recommendations on open access to scientific publications and research data set by the European Commission. Finally, the third prerequisite is to promote and encourage the open science culture among scholars. Sustainability of the project's results largely depends on the willingness of researchers to embrace the idea of open science, but also on the level of compliance of guidelines and infrastructural functionalities with their general and field-specific research needs and practices. Hence, the aim of this study was to explore knowledge, attitudes, and experience about open science principles among researchers and scholars from Serbian faculties and research institutes. Data were gathered in order to provide a baseline for the preparation of open science policies at national and institutional levels and for the adoption of a recommended set of features and functionalities for institutional open science repositories.

## Methodology

### Instrument

The questionnaire used in the survey was custom-made in order to cover all relevant issues related to the project's goals. It was prepared in LimeSurvey open source software and distributed

online in Serbian language. The English translation is given in Appendix 1. The questionnaire was composed of 38 questions organized into four categories: 1) general data about researchers, 2) data on typical participants' information-seeking behaviour and usage of various scientific information sources and literature, 3) data on participants' publication behaviour, preferred publication types, and general research activity, and 4) attitudes, experience, and overall knowledge related to the implementation of open science principles.

## Sample

There are more than 160 accredited faculties and research institutes in Serbia and some 100 registered research organizations in business sector. Approximately 16.000 researchers are in some way related to research and development activities. BE-OPEN project is mainly focused on boosting the engagement of Serbian universities in open science, but since this is a rather relevant issue for the Serbian science as a whole, invitation to participate in the survey was sent not only to the academics employed at the six state universities participating in the project, but also to all Serbian research institutes thanks to our partners and colleagues from the Association of Institutes of Serbia. It is estimated that the questionnaire was directly or indirectly addressed to some 11.000 scholars.

Current report presents the result as of July 15<sup>th</sup> 2017 but the questionnaire is still available for all interested participants at the BE-OPEN website: <http://beopen.uns.ac.rs/anketa>. A total of 1209 participants responded to the call and accessed the questionnaire. Out of that number, some 83% completed the full survey. If not stated otherwise, presented analyses have covered only the participants who answered all the questions. However, in order to make use of as much data as possible, we have applied pairwise deletion of cases and hence the exact sample size varies across questions from 803 to 968 participants.

## Results

### Descriptive data about participants

Regarding the participants' gender, there were slightly more women in the sample (56%). Some 2% of the participants have used their right not to declare their gender. Participants were not asked directly for their age but only for the approximate number of years they are active in the field of research and/or education. The number of participants' active years ranged from 1 to 47 with the mean value of 15.11, mode of 10 years, median of 12 years, and standard deviation of 10.1. These indicators suggest that the distribution is slightly positively skewed, meaning that a significant number of participants who completed the survey may be regarded as early stage researchers. Some 40% of the participants have the academic rank equivalent to associate or full professor. The most frequent academic rank among participants was the assistant professor or research associate (20%).

Figure 1 shows the distribution of participants across the institutions they come from. More than half of the participants were from the University of Novi Sad (BE-OPEN project coordinator) and the University of Kragujevac. The lowest response rate was at the State University of Novi Pazar.

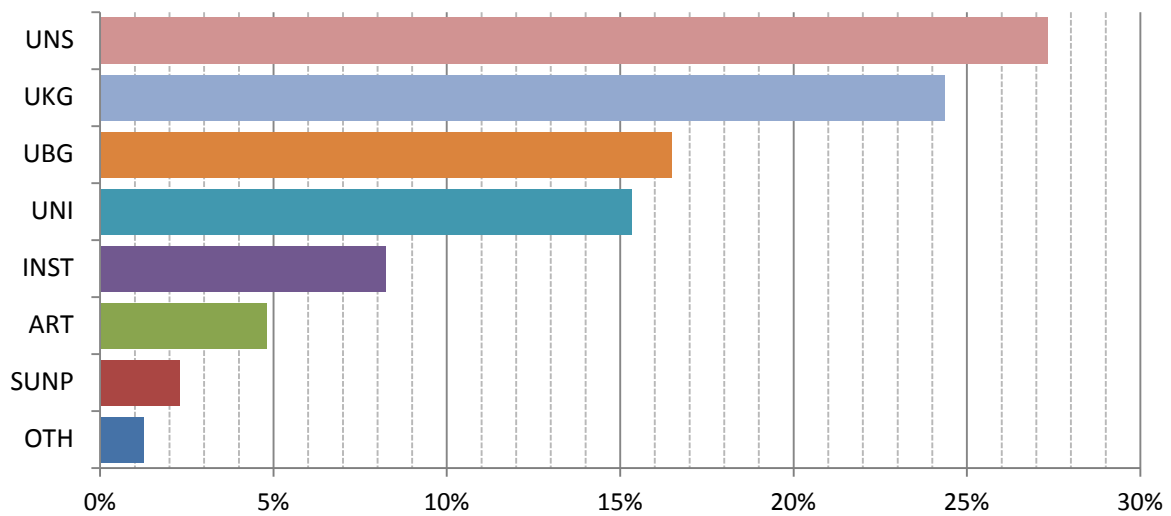


Figure 1. Percentage distribution of survey participants according to their employing institution

UNS - University of Novi Sad, UKG - University of Kragujevac, UBG - University of Belgrade, UNI - University of Niš, INST - various research institutes, ART - University of Arts in Belgrade, SUNP - State university of Novi Pazar, OTH - other institutions

Figure 2 shows the percentage distribution of participants based on their area of research expertise and/or interest. Serbian Ministry of Education, Science, and Technological Development recognizes 46 different scientific fields grouped into five wider research areas: *Social Sciences and Humanities (SSH)*, *Science (SCI)*, *Engineering and Technology (E&T)*, *Medical Sciences (MED)*, and *Arts (ART)*. Among the narrower disciplines, the largest number of participants came from the fields of Medical, Biological, Chemical, and Philological Science, and the lowest from the fields of Political Sciences, Management, Art, and Philosophy.

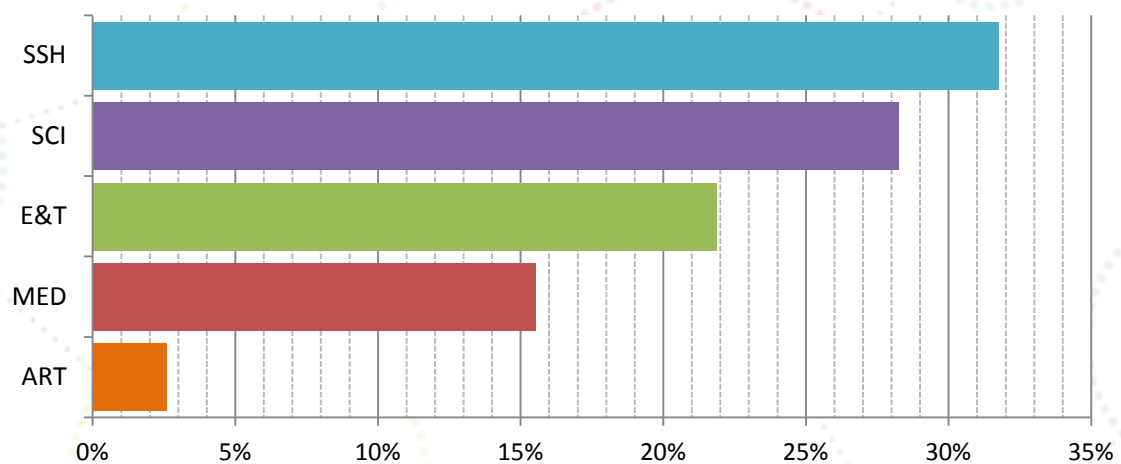


Figure 2. Percentage distribution of survey participants according to their field of expertise (abbreviations are explained in the text above)

Two final questions of the first section were related to the participants' overall involvement in projects supported by various funders, particularly those that have some form of open science policy or recommendations involved. Almost three quarters of the participants (73%) are currently using or have been using financial support from the governmental institutions, that is from Serbian ministries of education, science, agriculture, and defence or from the governmental secretariats of

the Autonomous Province of Vojvodina. Regarding the most popular programs of the European Commission, some 23% of participants are or were involved on Tempus and/or Erasmus+ programs, while only 6% of participants managed to get grants from the FP or Horizon 2020 programs. Additionally, some 11% of the participants received financial support from the other European programs, such as IPA, SCOPES, CEEPUS, DAAD, and COST. Figure 3 shows the percentages of participants that have received financial support from the three most common funding programs, in regard to their research field. Please note that displayed percentages do not sum to 100 since the participants were able to select more than one program or funder. We can see that almost all of the participants in the fields of Sciences and Engineering and Technology are or were involved in the projects funded by the Serbian governmental institutions, while these percentages are slightly lower in SSH and MED, and below 50% in Art. According to our data, FP and H2020 programs are mostly engaging researchers from the fields of Sciences and Engineering and Technology, with only few of them from the fields of Social Sciences and Humanities.

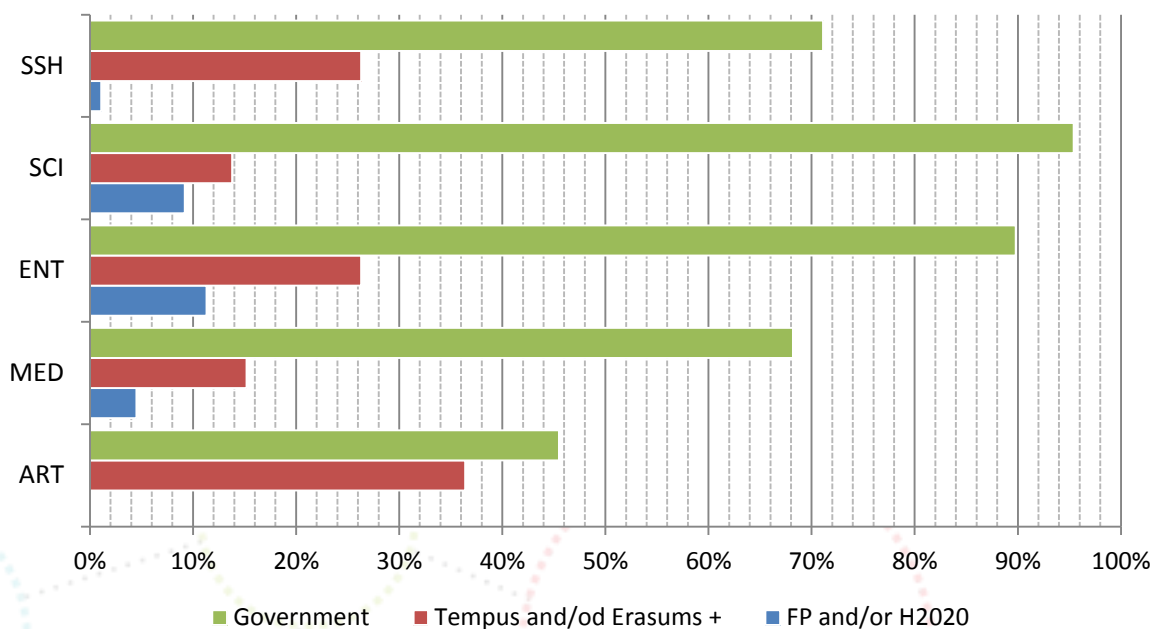


Figure 3. Percentage of participants from various research areas who received financial support within the three major funding programs (governmental, Tempus/Erasmus+, FP/H2020)

Finally, some 34% of the participants have stated that they were involved in a research or project that had some form of regulation regarding the open access. Those regulations were strict in 18% of the cases, meaning that there was a clear demand for publishing or depositing publications in open access. In 16% of the cases, these regulations were more in the form of recommendation for a good open access practice. These numbers are somewhat unexpectedly high and difficult to interpret, knowing that Serbian ministries have no clear open science policy or recommendations regarding the publication of results from publicly funded projects. One possible reason could be that some participants have certain misperceptions about the principles of open access publishing. Another possible explanation would be that some project teams had their own internal policies or recommendations which have encouraged researchers to make their outputs more accessible, more visible, and more transparent.

## Researchers' information seeking behaviour

The second set of questions was related to researchers' information seeking strategies and scientific information sources they use when searching for professional literature. Frequency of use of various scientific information sources among Serbian researchers is shown in Figure 4. Two most common ways of accessing scientific information are obviously general search engines and KoBSON services. Regarding the first, it is somewhat discouraging that the majority of participants are relying on services like Google that are not entirely appropriate for scholarly research. As for the KoBSON (Consortium for Coordinated Acquisition of Serbian Libraries), our results show that the concept of coordinated and centralized library acquisition at the state level represents an efficient solution for a small and economically relatively weak country to grant a satisfactory level of access to resources for researchers. On the other hand, such an advantage may have influenced the researchers' perception of open access to publications. Namely, KoBSON provides Serbian researchers with an unrestricted access to practically all major commercial bibliographic databases through the academic internet networks at their faculties and institutes. Consequently, researchers are not necessarily aware of the actual access prices and restrictions to scientific publications.

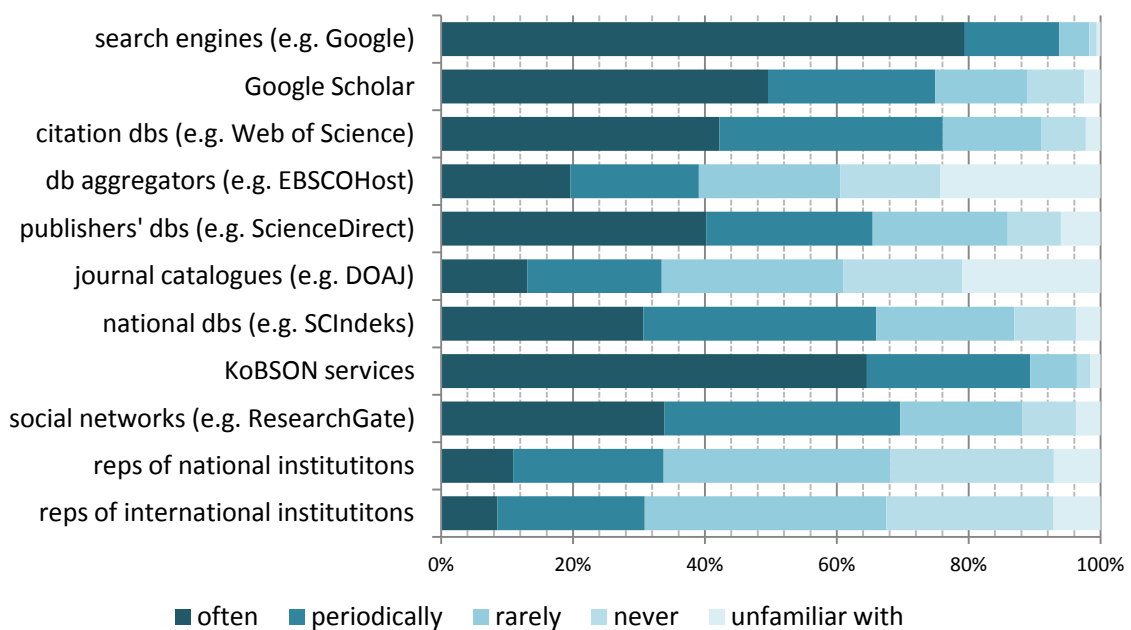


Figure 4. Frequency of use of various scientific information sources among participants (reps - repositories, db - database, KoBSON - Consortium for Coordinated Acquisition of Serbian Libraries)

Data presented in Figure 4 also indicate the importance of providing researchers with online access to national literature. Serbian Citation Index (SCIndeks) is a bibliographic database which indexes more than 200 Serbian academic journals and our results show that it's frequency of use is similar to that of the major international databases such as ScienceDirect, Springer Link, Wiley Online Library, IEEE Xplore and others. However, there are significant differences among scholars from different fields regarding the usage of national bibliographic database. The percentage of researchers who have stated that they regularly use SCIndeks to access scientific information is 47% in Arts, 44% in Social Sciences and Humanities, 29% in Medical Sciences, 26% in Engineering and Technology, and only 17% in Sciences. On the other hand, these percentages for the international

databases are somewhat opposite. Some 52% of the researchers in the fields of Engineering and Technology, 51% in Sciences, 34% in Medical Sciences, 27% in Social Sciences and Humanities, and only 7% in Arts have stated that they regularly use international sources. It should also be noted that differences in the frequency of use of various sources is also related to the length of researchers' activity period. Data presented in Figure 5 should be taken with a grain of salt due to large variability within groups. However, nonparametric group-to-group comparisons indicate that significantly more early stage researchers are among those that rarely use national database and at the same time significantly less among those researchers that never use social networks for scholars. Early stage researchers seem to be more directed towards international sources and towards services which provide additional functionalities on top of searching or browsing.

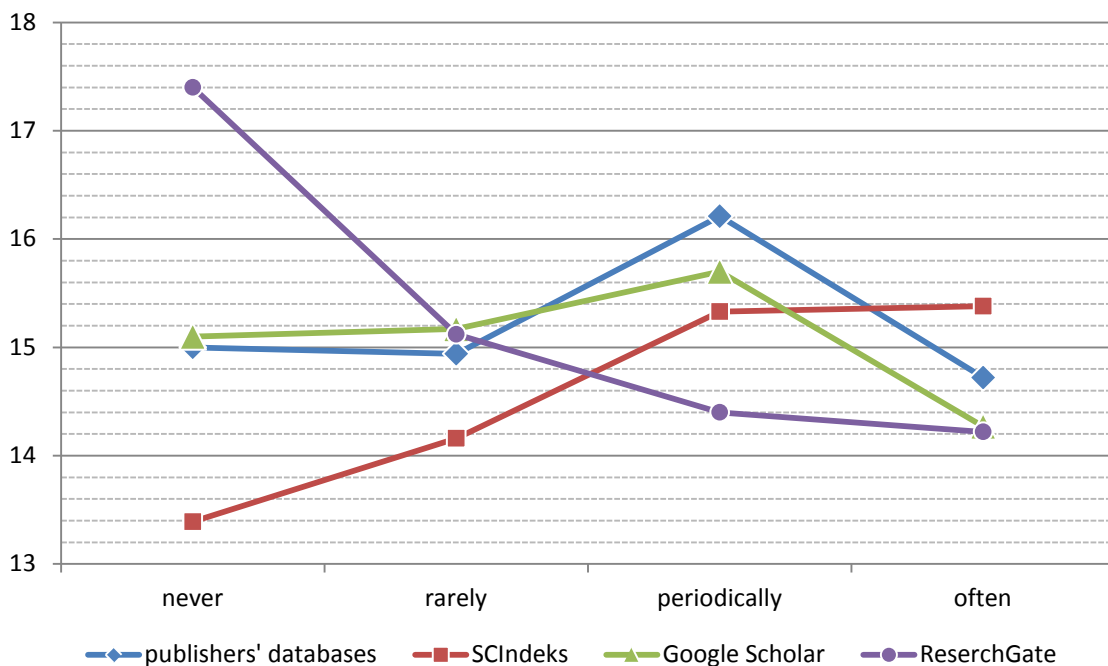


Figure 5. Relationships between the average length of researchers' period of activity and the frequency of use of various scientific information sources

Finally, it is of particular interest for the objectives of the BE-OPEN project to notice that institutional repositories, both national and international, are relatively rarely used. One simple explanation would be that they are basically all searchable and accessible through general search engines. This result indicates that the future national open science platform for Serbian universities should provide some specific and advanced functionalities if the intention is to make it more than a mere repository and source of metadata for Google Scholar.

Some typical information seeking strategies used by the participants in this survey are shown in Figure 6. The most common strategy is keyword search. This is in line with the fact that the majority of respondents have stated that they most often use Google and Google Scholar to access scientific information. Another frequently used strategy is keeping track with new issues of particular journals of interest. However, it is interesting to mention that somewhat unexpected disciplinary differences are noticeable in relation to this issue. It is commonly believed that journals are more important dissemination channel for researchers in the fields of Science and Engineering and Technology, compared to those from the fields of Social Sciences and Humanities. In contrast to

that, our results indicate that significantly larger number of researchers from the SSH fields report that they regularly follow new journal issues related to relevant topics.

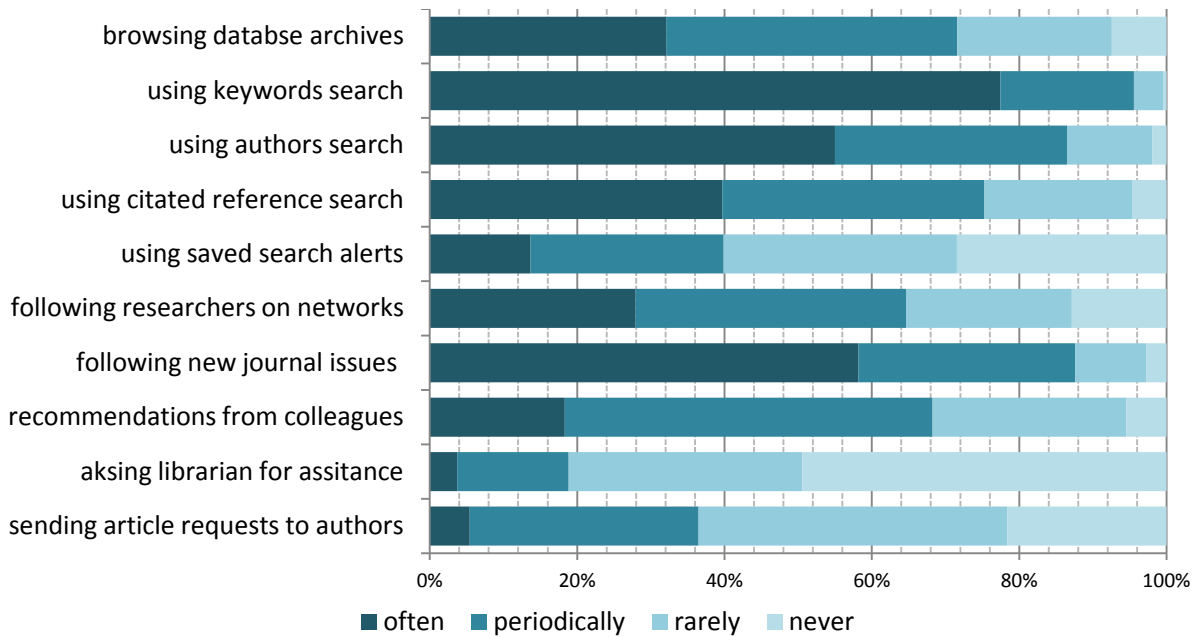


Figure 6. Prevalence of typical information seeking strategies among the participants in the survey

At the end of this section, participants were asked to estimate the percentage of necessary literature they manage to find through legal sources available to researchers in Serbia. Results are presented in Figure 7. Overall, relatively small number of participants (34%) has reported that they managed to find a significant proportion of necessary literature. Some 27% of survey participants reported that they were able to find less than 50% of needed publications. It is evident that scholars in the field of Arts most frequently encounter difficulties in accessing professional literature. The situation is somewhat better, although far from satisfactory, in the fields of SSH. It seems that current library acquisitions through the KoBSON service are best tailored to researchers in the fields of Sciences, Engineering and technology, and Medical Sciences, although there is still a significant proportion of literature that researchers are not able to legally access.

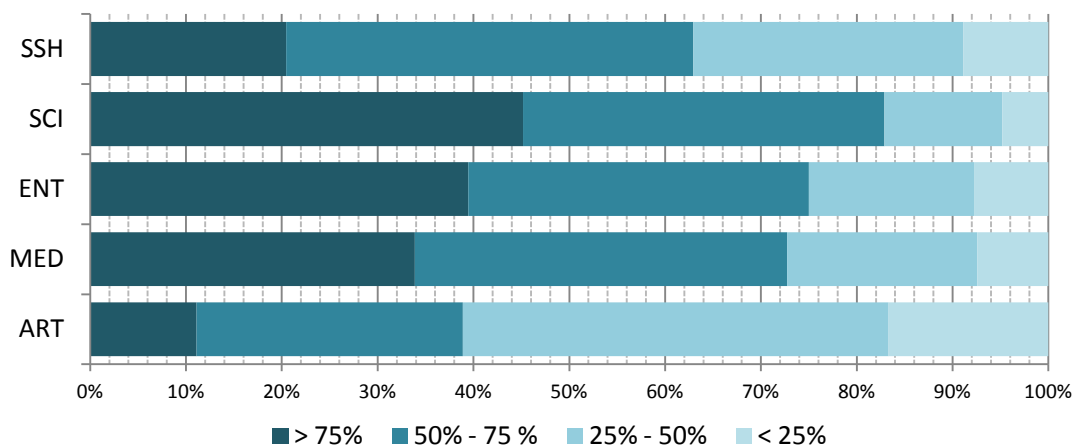


Figure 7. Percentages of necessary professional literature participants from different fields were able to find using legally available sources in Serbia



In order to investigate the reasons behind the relatively poor accessibility of necessary literature, we have asked participants to list the main obstacles they encounter when searching for scholarly information. Their answers are shown in Figure 8. According to the participants' in our survey, most common reason for not being able to access larger proportion of required publications is that these specific sources are not part of the current subscription at the national level. However, this does not necessarily mean that the KoBSON acquisition policy should be revised, because some of the required publications may not be accessible at all through common bibliographic databases. Another relatively frequent reason is the need for older literature that is often not available in digital form, particularly in SSH fields and Arts. These two subject fields also differ from others in the more emphasized need for national literature. Finally, scholars in the field of Arts obviously have more pronounced need for specific formats and types of scholarly information, such as multimedia, that are not commonly covered by subscribed databases.

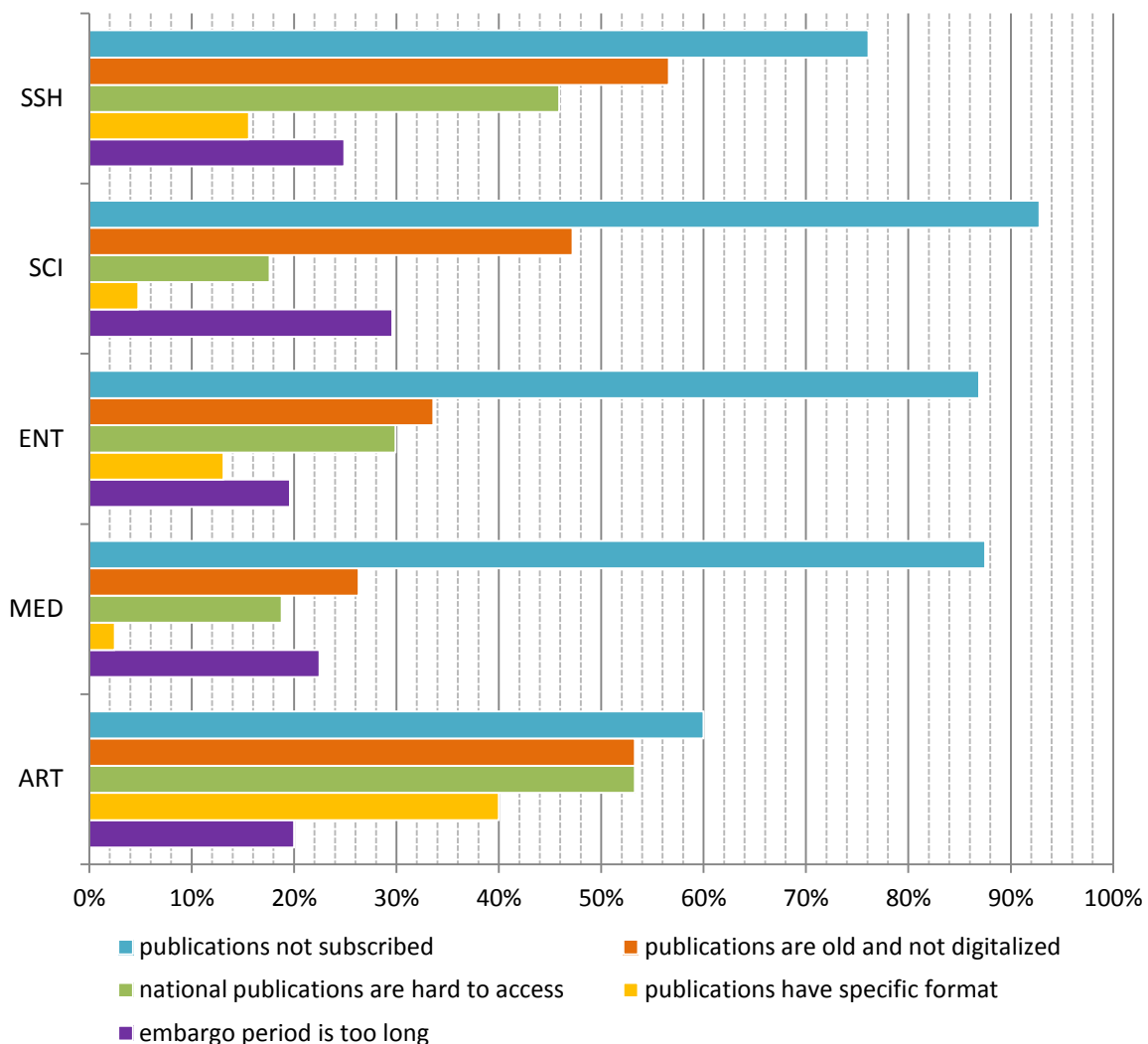


Figure 8. Percentage of participants from various research areas who received financial support within the three major funding programs (governmental, Tempus/Erasmus+, FP/H2020)

## Researchers' publication behaviour and dissemination strategies

The third section of the questionnaire addresses researchers' strategies in publication and dissemination of research results. The first question was aimed at analysing the importance of particular types of publications for the researchers' scientific production. Researchers were asked to estimate the importance of the following types of publications: *books and monographs*, *edited books and chapters in edited books*, *journals and journal articles*, *conference proceedings*, *technical reports*, *patents*, and *software*. The importance was rated on a 5-point scale, with the points ranging from 1 (not important at all) to 5 (very important). All types of research outputs were assessed separately for publications published by national publishers and those published by international publishers.

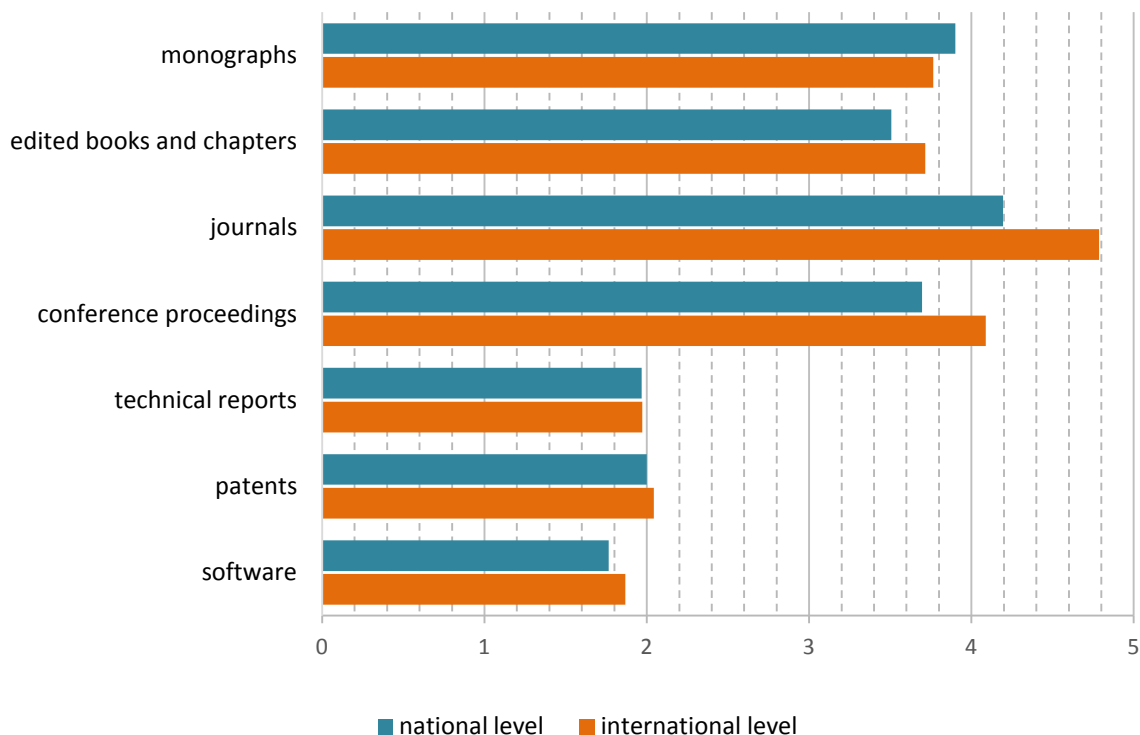


Figure 9. Average values of perceived importance of various types of scientific publications

The results suggest that overall mean ratings are higher for scientific publications than for other types of scientific output. Publishing at the national level, i.e. monographs, edited books, journals, and conferences from the national publishers, is rated as more important than publishing at international level. Scientific journals are rated as the most important type of scientific publication for Serbian researchers. Other types of scientific output are rated as virtually equally important at international and national levels.

„Breakdown“ into scientific disciplines reveals slight differences among scientific fields with regard to the importance of the particular types of scientific output. International journals are rated as more important than national journals in Sciences, Engineering and Technology, and Medical Sciences, whereby in SSH the importance is equal, while in Arts, national publications bear more importance than international.



Figure 10. Average values of perceived importance of various types of scientific publications within different scientific fields

By responding to the second question within this section, the participants rated the importance of availability of their own publications in various online services and bibliographic databases. The importance was rated on a scale ranging from 1 („not important at all”) to 5 („very important”). The services and databases listed were the following: Scopus, Web of Science (SCI, SSCI, A&HCI, ESCI, CPCI), SCIndeks (Serbian Citation Index), DOI Serbia, institutional internet archive, social networks for scholars (ResearchGate, Academia.edu...), any source searchable by Google Scholar, and personal web page.

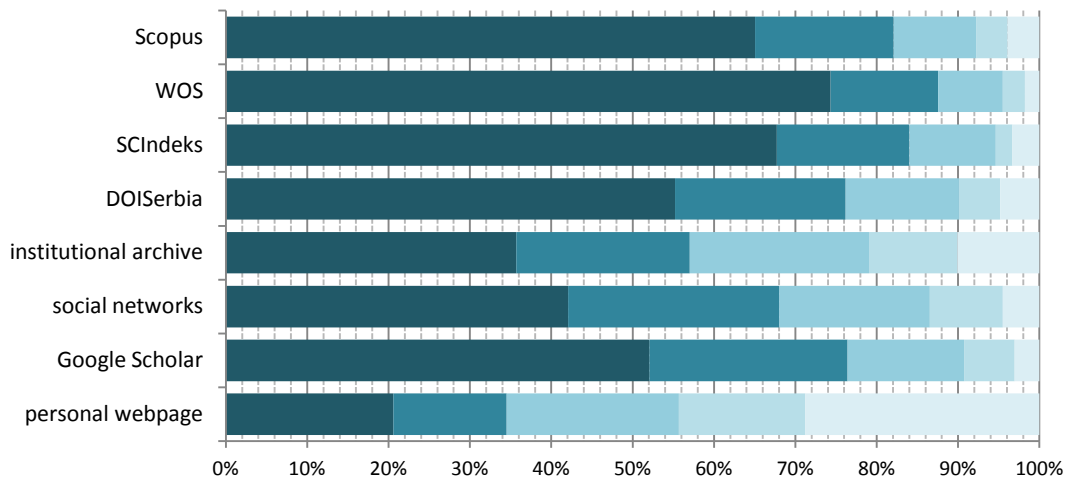
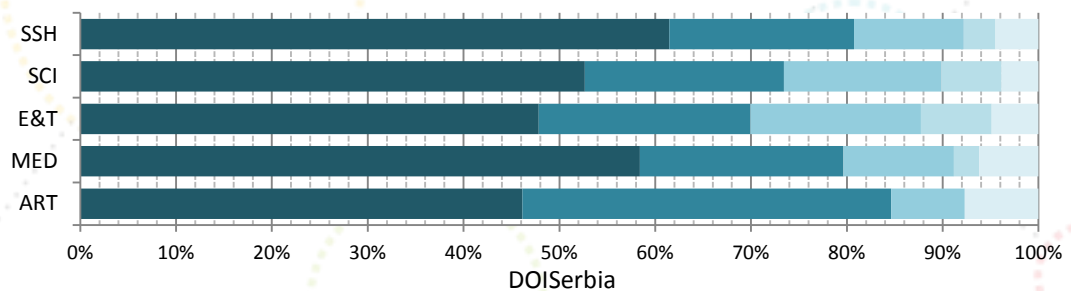
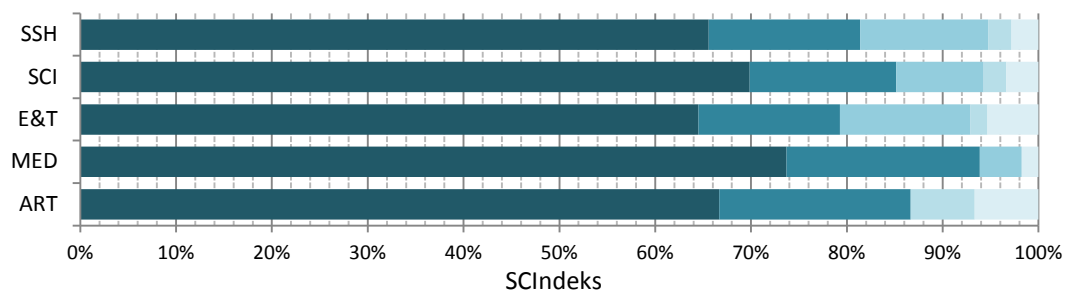
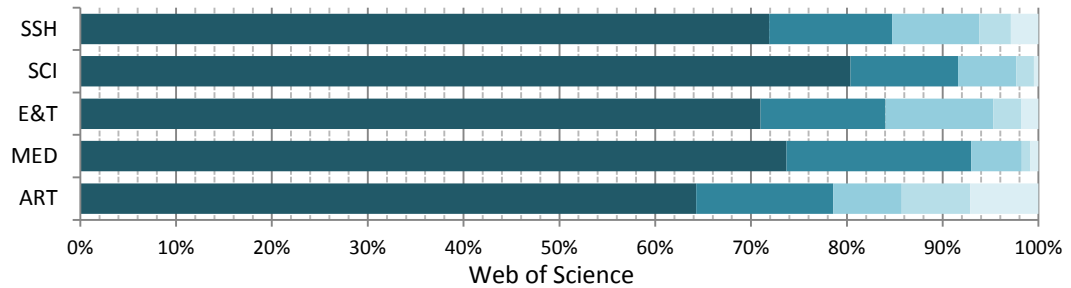
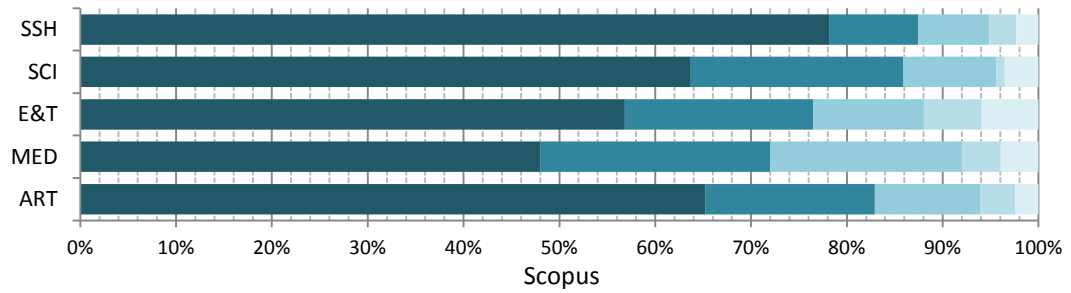


Figure 11. Perceived importance of availability of participants' publications in various online services and databases (graded on a scale from "completely agree" to "completely disagree")



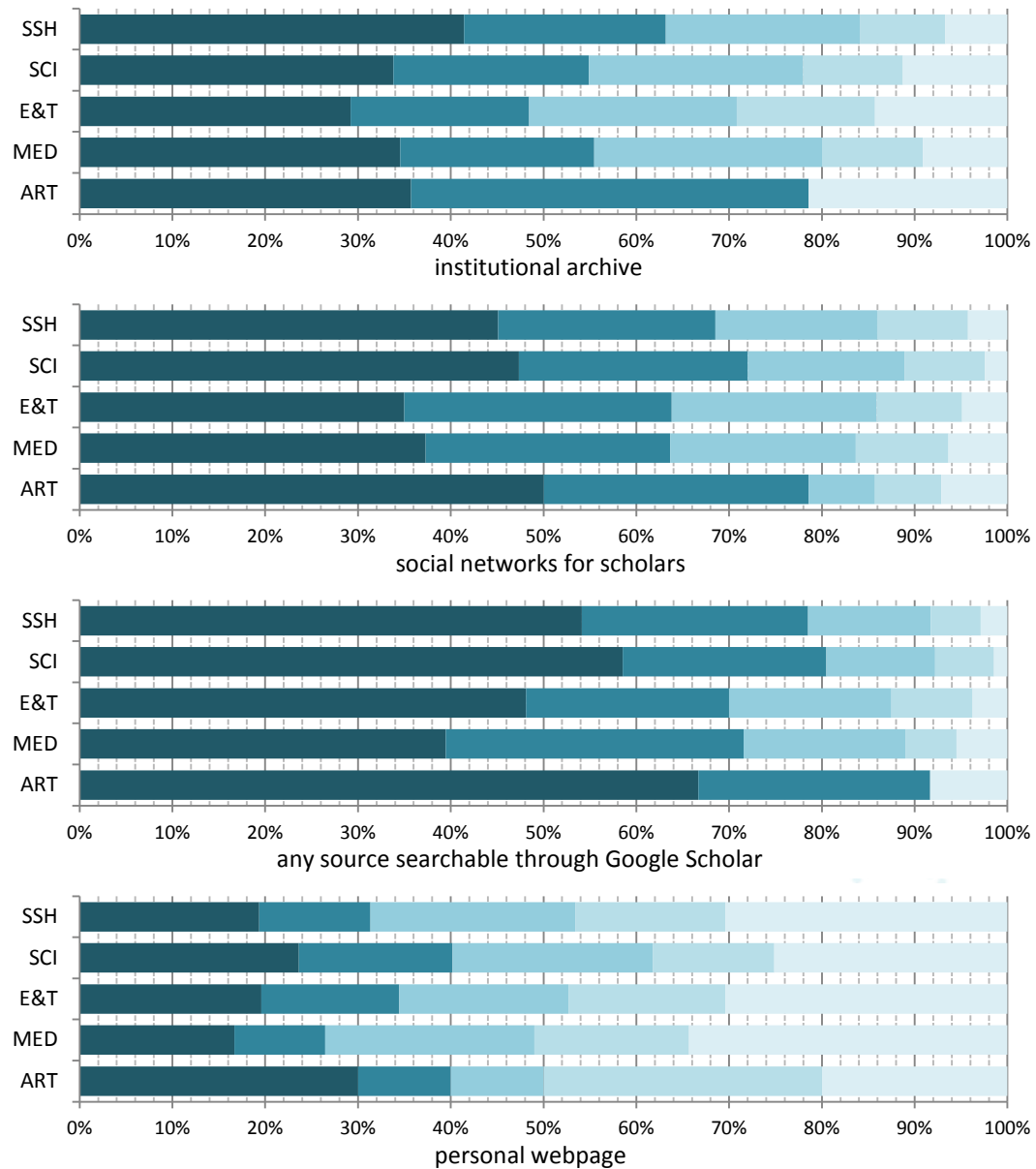


Figure 12. Perceived importance of availability of participants' publications in various online services and databases across different fields (graded on a scale from "completely agree" to "completely disagree")

The results presented in Figure 11 show that the participants prefer major international databases (Scopus and WOS) as a most relevant channel for dissemination of their own publications. National sources (SCIndeks and DOI Serbia) are also relatively highly rated while other sources are rated somewhat lower, with personal webpages and institutional archives having the lowest overall ratings. As for the ratings within disciplines (Figure 12), they tend to follow the overall pattern, with several minor deviations. Namely, institutional archives are rated as lowest within Engineering and Technology, and highest within Arts and Social Sciences and Humanities. Personal webpages are apparently the least important source within Medical Sciences. Ratings within Social Sciences and Humanities tend to follow the same pattern as in Sciences. Specific sources are the most important within Arts. Finally, it should be mentioned that WoS is generally slightly more preferred to Scopus, except for the fields of SSH and, to lesser extent, Arts. This is somewhat expected result since Scopus is known to cover more journals from those fields than WoS.

The third question concerns participants' awareness of the existence of institutional repositories for depositing publications. A total of 244 participants (30.5%) responded that such repositories were established in their institutions, whereby 198 participants stated that the publications contained in repositories were openly available, while 46 participants responded that the publications were available only within the institution. Around 9% participants claimed that the development of a repository was projected by the institution.

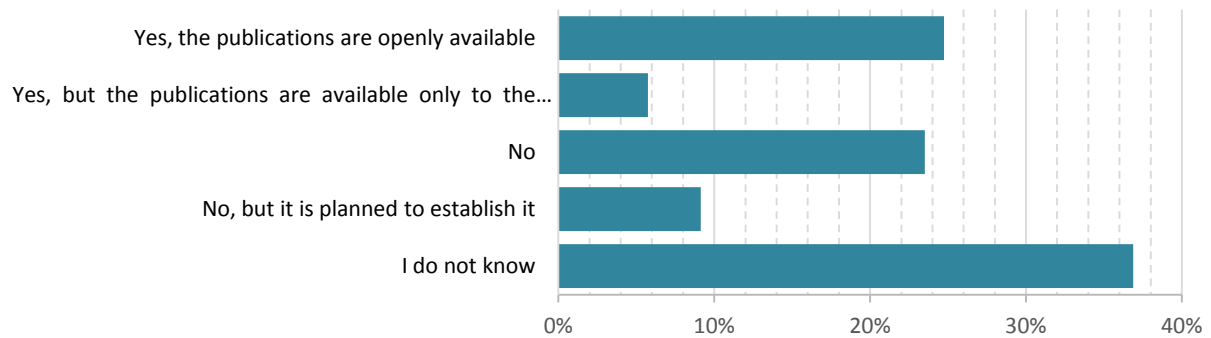


Figure 13. Participants' awareness of the existence of institutional repositories

The participants who responded positively to the previous question were further asked to name the types of publications contained in their institutions' repositories. The results presented in Figure 14 suggest that theses, dissertations, and scientific articles are most frequently deposited in such repositories, followed by conference presentations and monographs. Research data is apparently fairly rarely deposited in institutional repositories. Around 13% participants confirmed that their institutions' repositories contained data files.

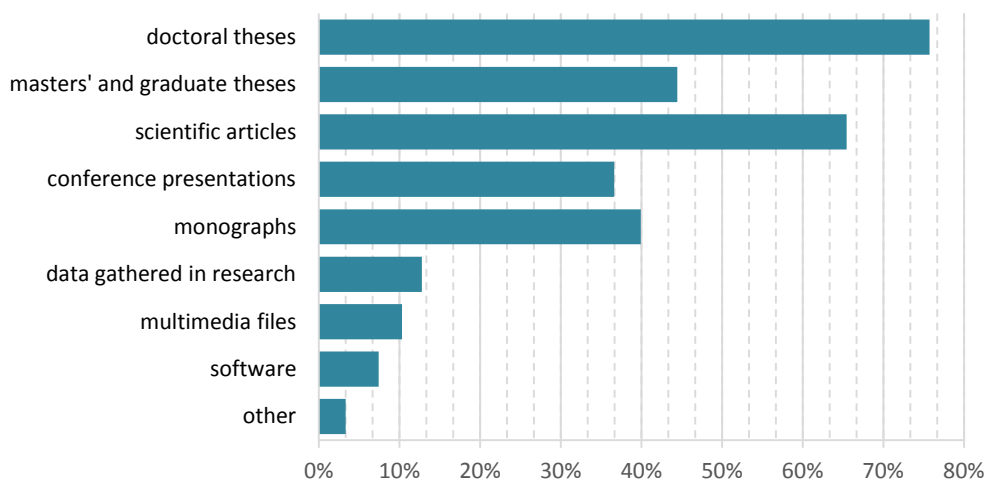


Figure 14. Types of publications deposited in institutional repositories

The next set of questions addressed publishing in Open Access regime (Figure 15). Approximately 53% participants published in Open Access, whereby around 18% of claim that most of their publications are open access, while around 35% have published only a minor portion of their publications in open access. A total of 238 participants claimed that open access publishing was always cost-free, while 95 reported the costs of publishing open access, the largest reported sum being 5000 euros.

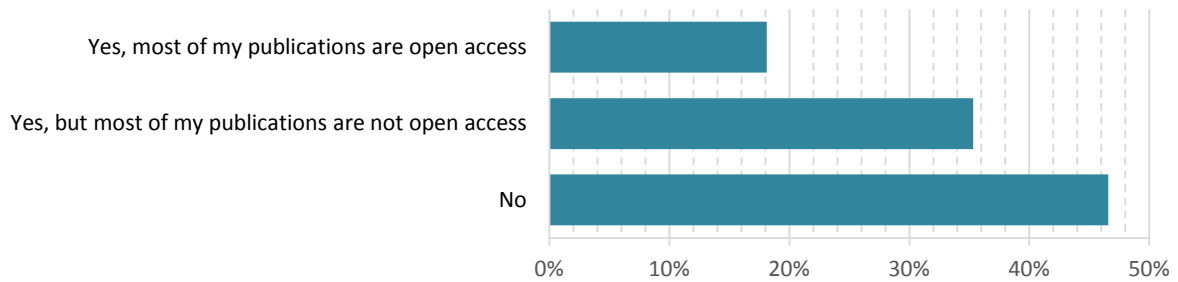


Figure 15. Self-perceived frequency of publishing in open access among participants

Among scientific fields (Figure 16), the lowest rate of open access publications is in the field of Arts, while the portion of scholars who have published majority of their papers in open access mode is the highest within the field of Social Sciences and Humanities. One simple explanation for this result would be that scholars in SSH are often oriented towards publishing in national journals that usually charge neither publication nor subscription fees.

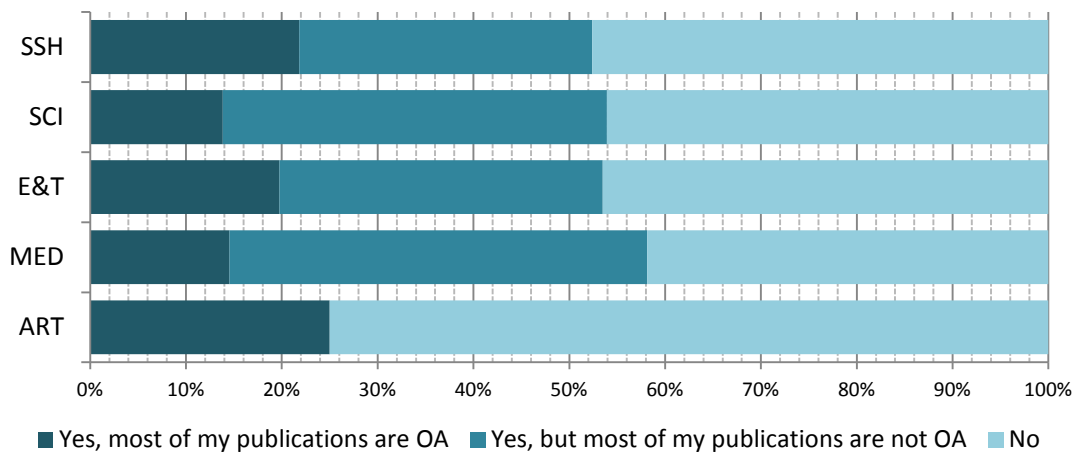


Figure 16. Self-perceived frequency of publishing in open access among participants: comparisons among scientific fields

Participants were next asked if they themselves post their publications online (Figure 17). A minority of scholars (12.6%) has the habit of posting their publications on the internet regularly, while for 18.2% participants publications are posted online by others. Most participants (39.3%) do not post their publications online, while 29.8% post online occasionally.

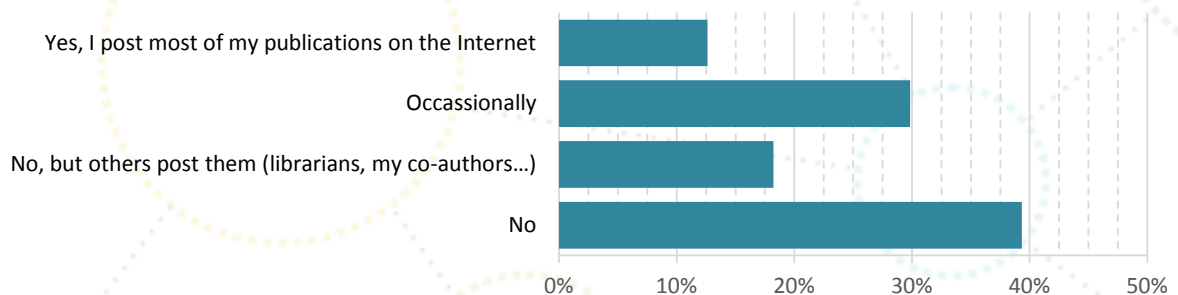


Figure 17. Posting one's own publications online

Comparisons among scientific fields (Figure 18) show that the largest percentage of scholars who make their publications available online is within the fields of Sciences, Social Sciences and Humanities, and Engineering and Technology. Virtually none of the academics in the field of Arts post their scientific materials online.

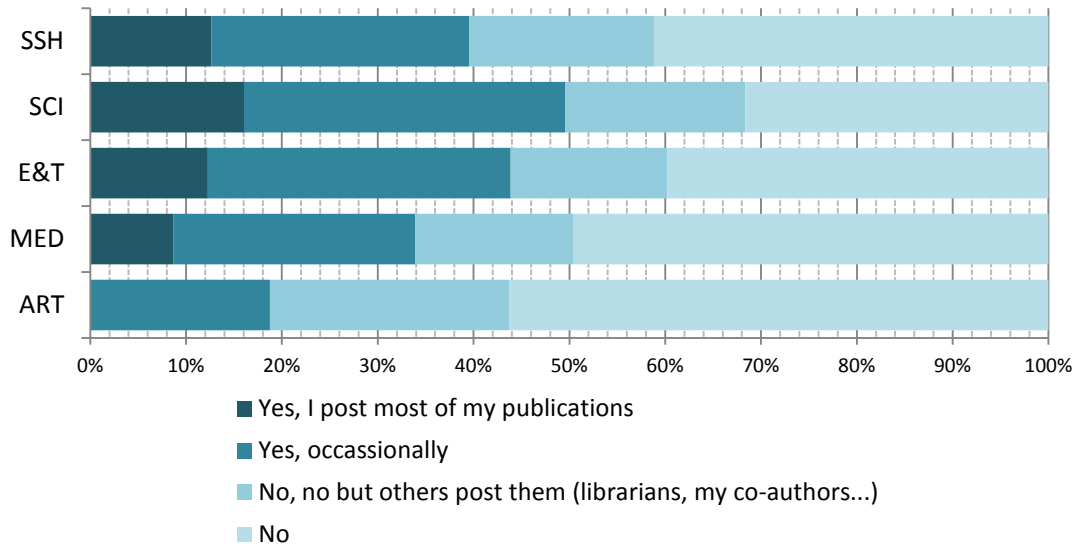


Figure 18. Posting one’s own publications online: comparisons among scientific fields

The participants whose response to the previous question was negative (N = 315), namely the participants who never publish their materials online, were further asked the reasons for not posting their publications online. The participants were allowed to check multiple responses. The most frequently stated reason is that the publications are already available online, followed by concerns over permission issues, unawareness of the possibility, not feeling obliged to do it, and concerns over possible misuse. Results are presented in Figure 19.



Figure 19. Reasons for not posting publications online



The participants who responded that they post their scientific materials online were asked about the types of publications posted and the services they post to. The results presented in Figure 20 reveal that scientific articles and conference proceedings are the most frequent publications to be posted online, while ResearchGate and Academia.edu are the most popular services. The least popular services are institutional archives and personal web pages, except for the purposes of depositing teaching materials.

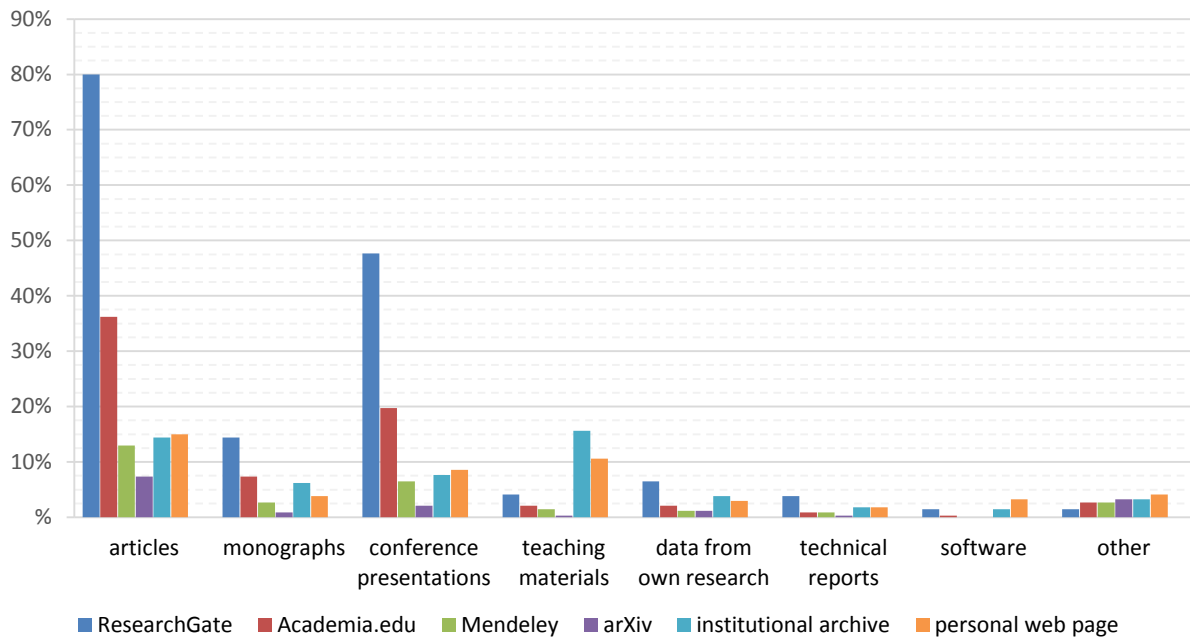


Figure 20. Types of publications posted online and the online services used

The following question, addressed to the scholars who post their publications online, is whether they check for the conditions for publication, namely the permissions for publication, optionally consulting the SHERPA/RoMEO database (Figure 21). A majority of participants claimed that they are not familiar with the procedure, while a slightly smaller number responded that they always check. A minority of researchers responded that they sometimes post online even if it is prohibited. Around 10% participants who post online expressed their belief that the authorship grants them the right to distribute the publications.

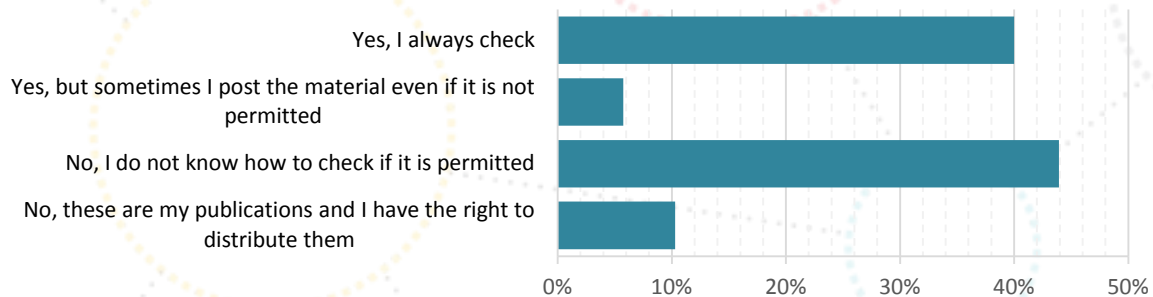


Figure 21. Checking for permissions before posting publications online

Among the scientific fields, the greatest awareness of the permission issues is within the field of Arts (Figure 22). However, within this particular field there is an apparent polarization in the scholars' notions of authorship issues: they either always check for conditions before publishing, or believe that by being authors they are granted permission to distribute the publications. Within other academic fields, the researchers either check for before posting, or claim that they are unfamiliar with the procedure.

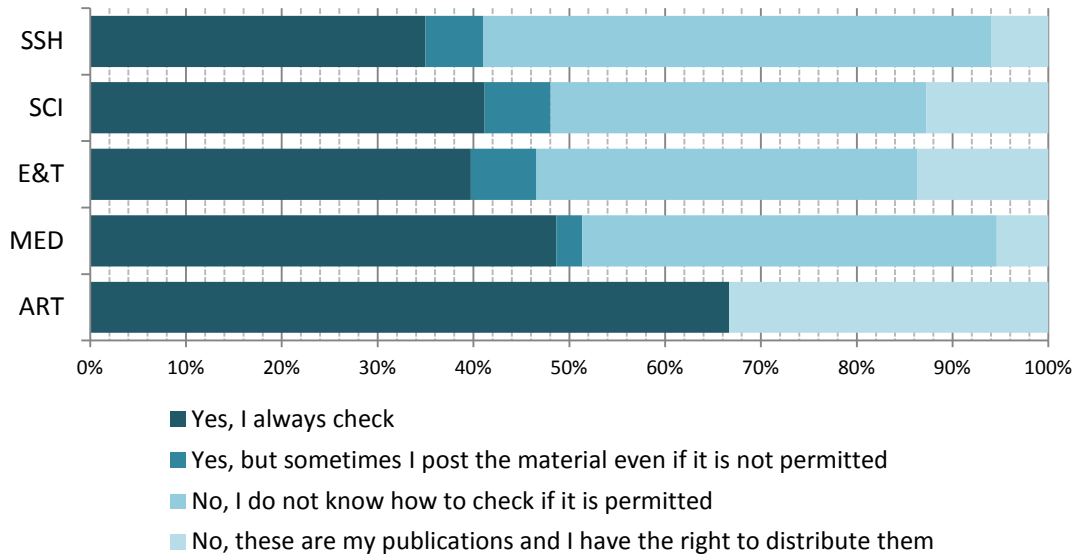


Figure 22. Checking for permissions before posting publications online: comparisons among scientific fields

The final question within this block was intended to cover desirable features of an internet service that the scholars use, or would use, for depositing their publications and other materials (Figure 23). The participants were asked to check five most desirable features. Judging by the overall percentage, the most favourable feature is the information on the number of one's citations, followed by the information on the number of downloads. Information on new publications in one's field and the facilitated communication with other researchers are among highly favoured features.

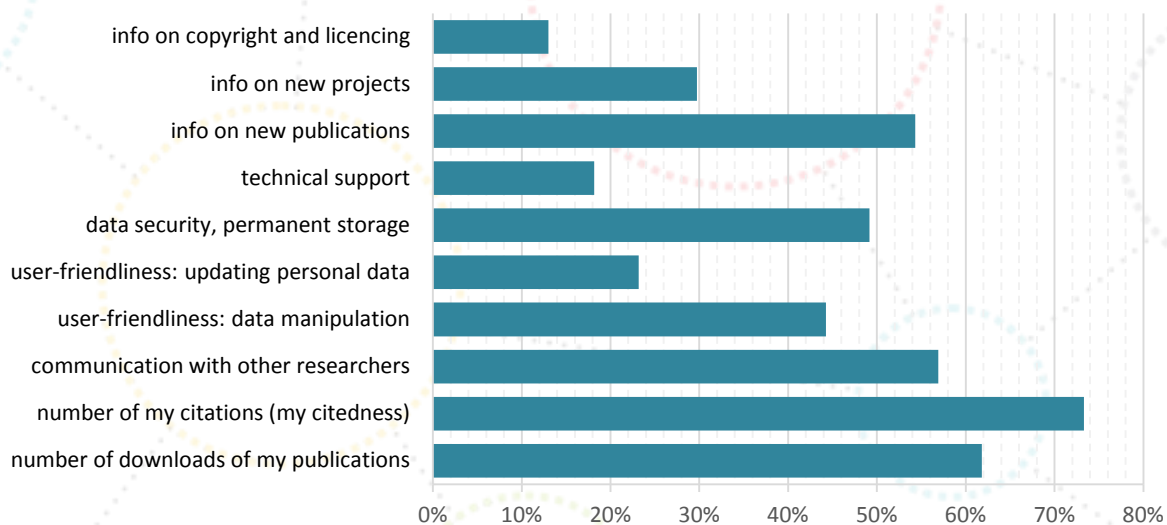


Figure 23. Participants' perception of the importance of various features of an OA repository or service

Preferences within academic fields largely follow the overall pattern, whereby citedness is the most favoured feature in SSH, and the number of downloads is preferred in the field of E&T (Figure 24). Security of deposited data is most appreciated by the scholars in the field of Arts, while communication with other researchers is highly regarded in Sciences.

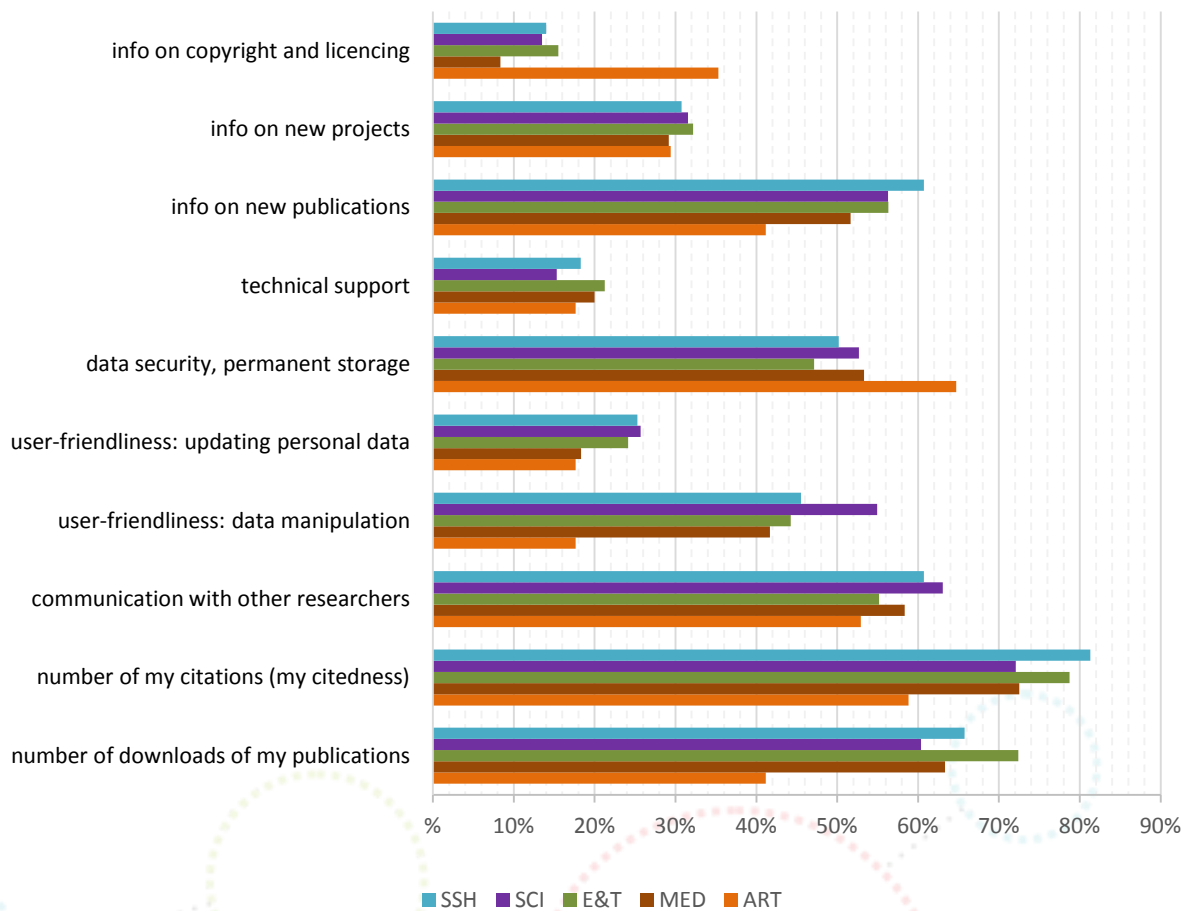
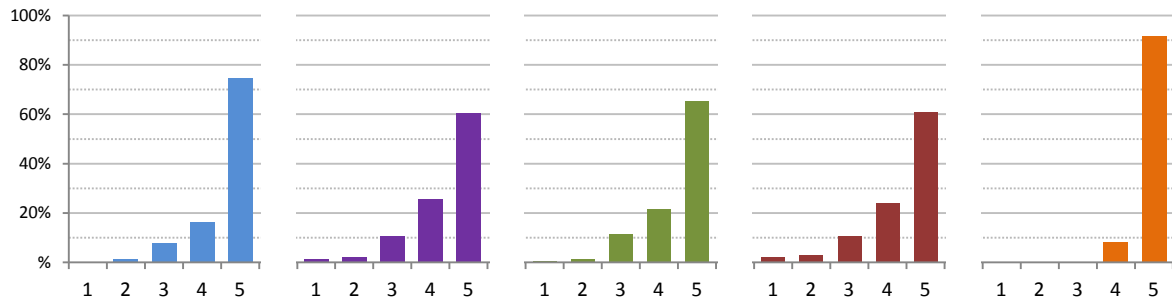


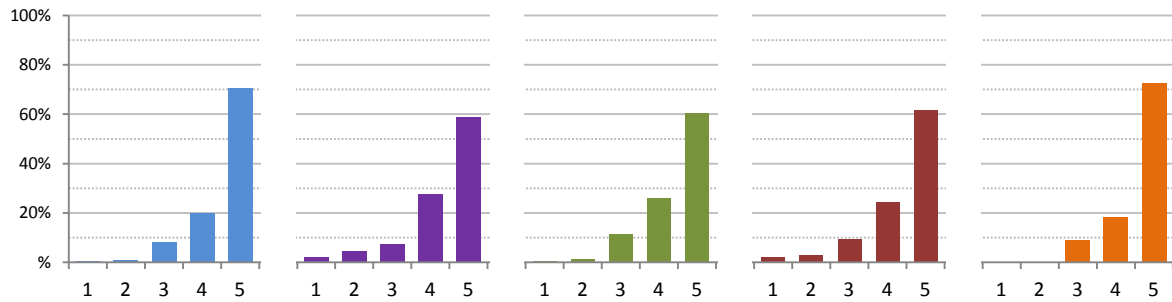
Figure 24. Internet service / repository: preferred features – comparisons among fields

### Researchers' attitudes towards open science

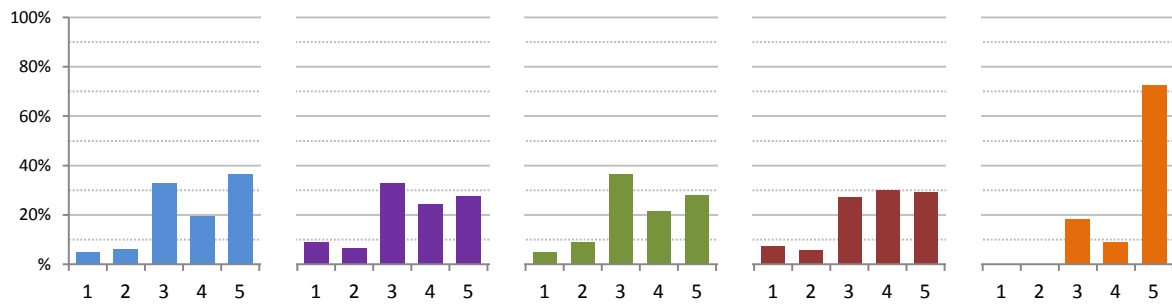
Final section of the questionnaire has covered participants' attitudes and knowledge about the various aspects of open science. In the first question, they were asked to rate how true or false were several statements describing some possible advantages, but also some misconceived benefits of publishing in OA. Level of agreement was measured on a scale ranging from 1 (completely false) to 5 (completely true). Results are shown in Figure 25. In general, attitudes of the participants across all subject areas are rather similar. Researchers mainly perceive open access as a way to promote their own work and to make it more visible and more cited and hence the level of agreement with the first two statements is very high. Medians for the level of agreement with other statements are more or less lower. For example, researchers do not fully agree that OA will improve communication between the science on one side and the industry and society on the other. Similar distribution is obtained for the statement that OA is the way to provide students with more accessible education material. Exceptions regarding the latter are the scholars in SSH fields and Arts.



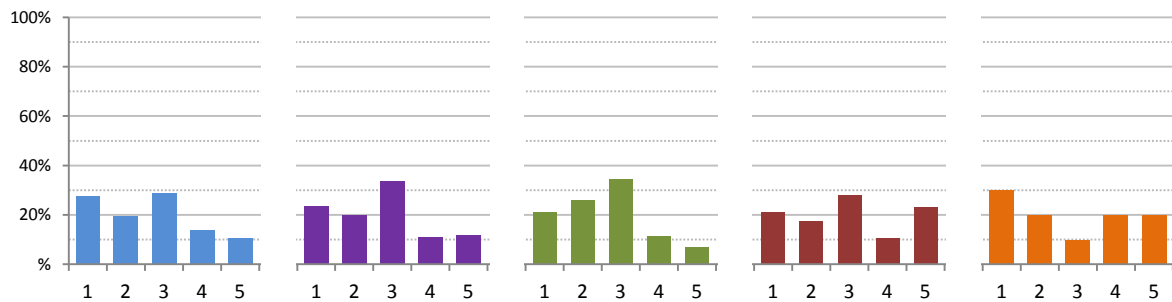
Better visibility and accessibility of my publications



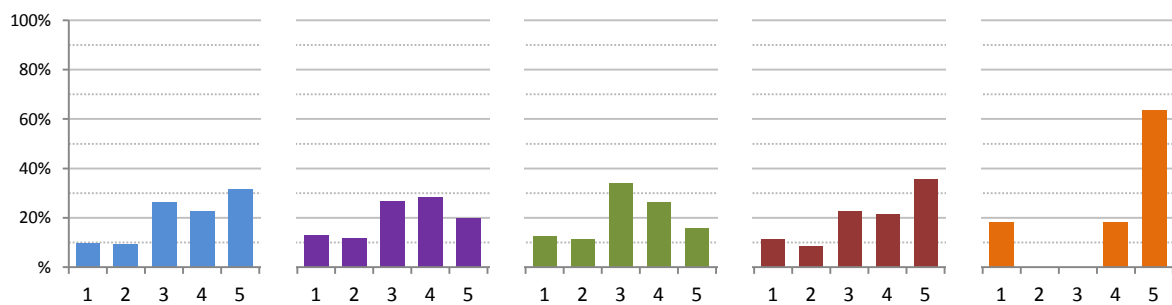
Better chance for my publications to be cited



Possibility to keep copyright on my publications



Less rigorous review process



Faster publication time

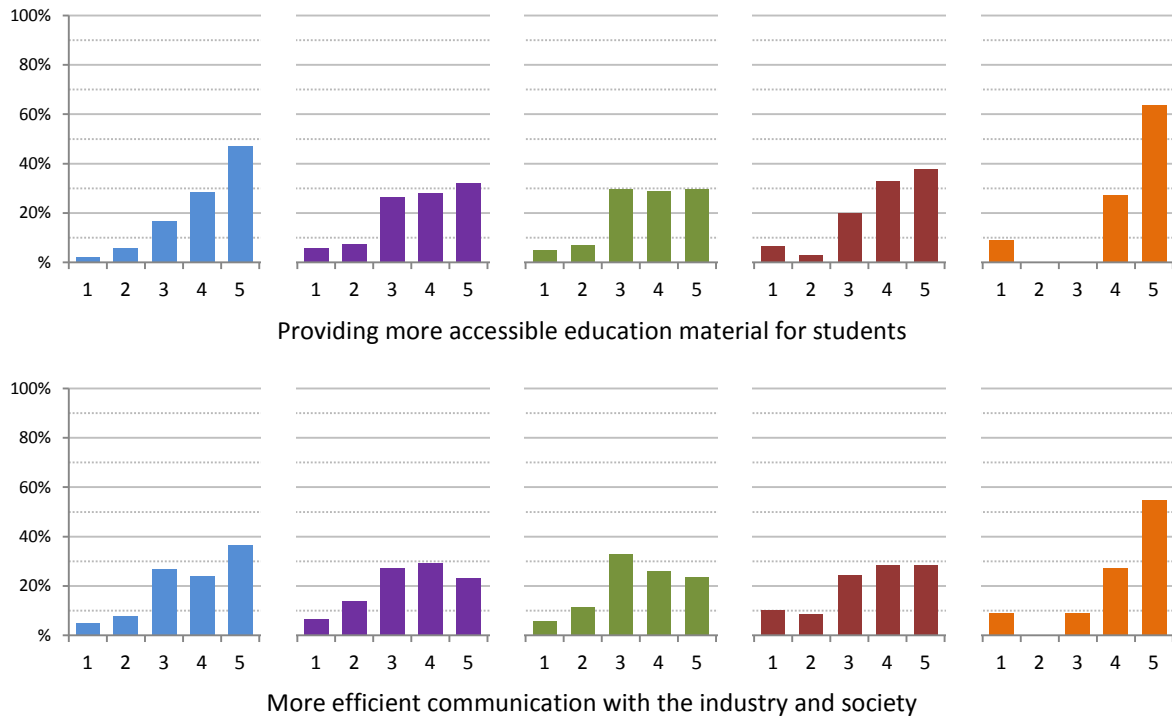


Figure 25. Level of agreement with various statements about the possible advantages of open access among participants from different fields (■ - SSH, ■ - SCI, ■ - ENT, ■ - MED, ■ - ART)

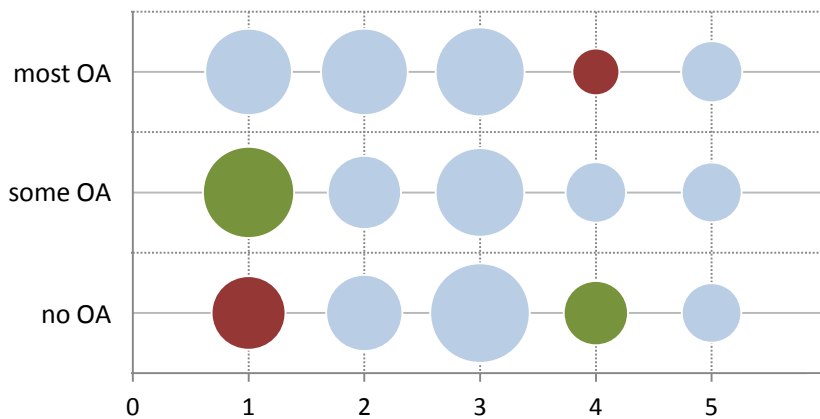


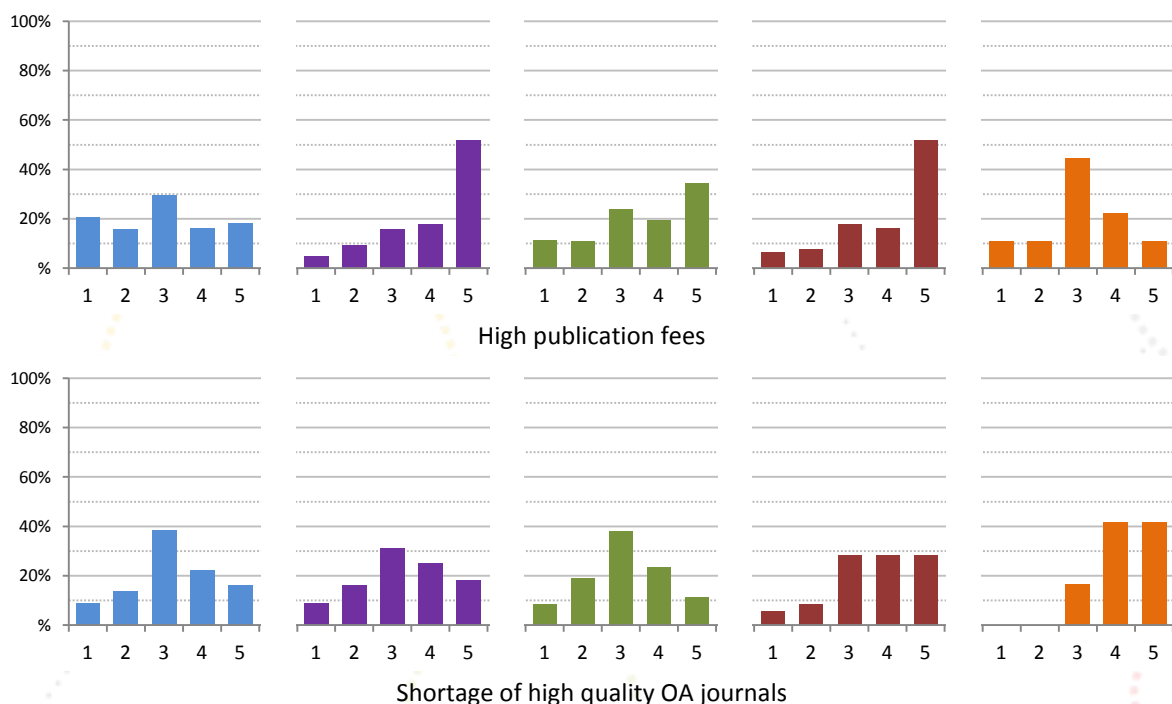
Figure 26. Relationship between the participants' perception that OA journals have less rigorous reviewing process and their actual experience with publishing in OA journals

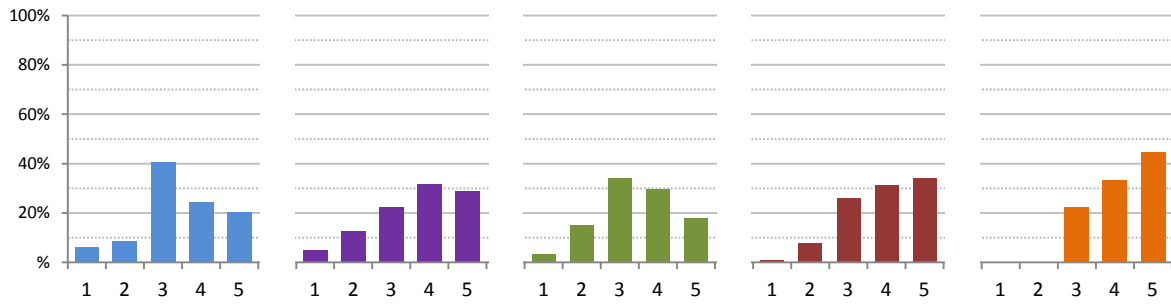
Some of the statements above were in some extent aimed at measuring participants' general knowledge and possible mistaken beliefs about open access. For example, perception that OA journals have less rigorous reviewing process may be considered as unsound but although the majority of participants were ambivalent or considered this statement more or less false, a notable number of researchers do perceive OA publications as less reliable. This most probably indicates that researchers often identify OA publications with so-called "predatory" journals because the large number of such dubious publications has emerged in the last period. In order to further investigate this issue, we calculated cross tabulation statistics for the relationship between the participants' perception of OA reviewing process and their actual experience with publishing papers in OA journals. Results are shown in Figure 26. Green circles indicate categories having significant positive

standardized residuals, while red circles indicate categories with significant negative residuals. This particular distribution of frequencies means that the researchers who do not publish in OA journals have more negative attitude towards the reviewing process for OA journals. However, it is difficult to offer a solid explanation for such a result. This may be an indicator of some form of misperception of OA journals in general, but can also mean that the authors who publish in OA journals tend to improve the overall impressions on OA.

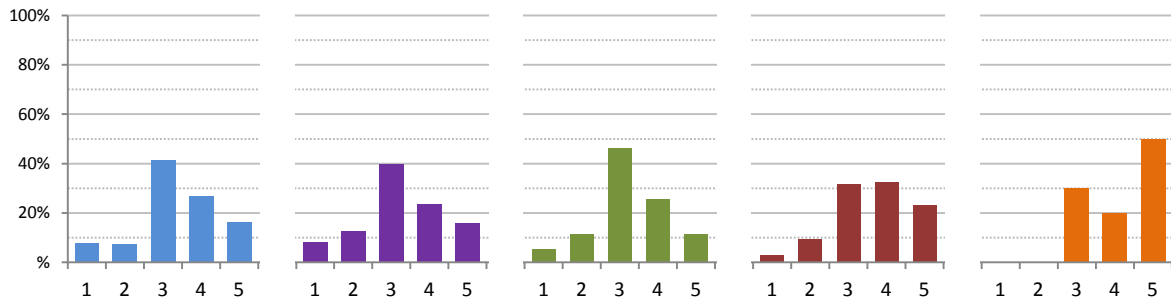
Another possible misconception is related to copyright issues. A considerable number of participants do not recognize a possibility to keep copyright on their publications as an advantage of publishing in OA. However, this may indicate that they are not aware of this opportunity, but also that they are actually not concerned with these issues. Finally, we would like to briefly comment on some free answers about the possible advantages of publishing in OA. Several participants have stated that they see OA publishing as a mean to reduce (alleged) bias towards the researchers from (scientifically) small countries and to make review process more transparent.

The next question was intended to cover participants' perception of possible disadvantages of publishing in OA. Participants' level of agreement with eight statements was measured in the same way as in the previous questions and results are presented in Figure 27. Unlike with the possible advantages, it is hard to select a statement that would represent a perceived flaw of OA publishing. Participants were rather indecisive and hence the median values for most of the statements were close to 3. However, there are some exceptions. Researchers in the fields of Sciences, Medical Sciences, and Engineering and Technology do perceive that publication fees for publishing in OA are too high and may be an obstacle for the wider adoption of this form of knowledge dissemination. Significantly different pattern of answers in the group of researchers from SSH fields may be the result of different publication patterns. Namely, it is believed that scholars in SSH are more directed towards publishing in national journals compared to their colleagues from Sciences. As we have mentioned in the Introduction, the majority of Serbian journals are published in platinum open access and this may be the reason why participants involved in SSH research do not perceive high publishing fees as a major disadvantage of OA.

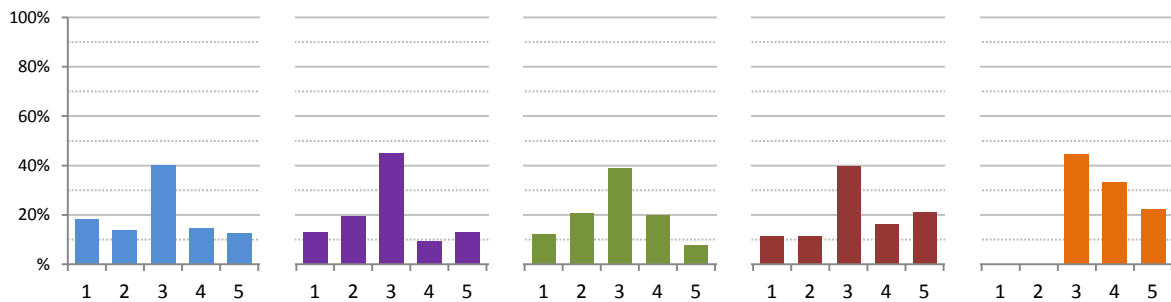




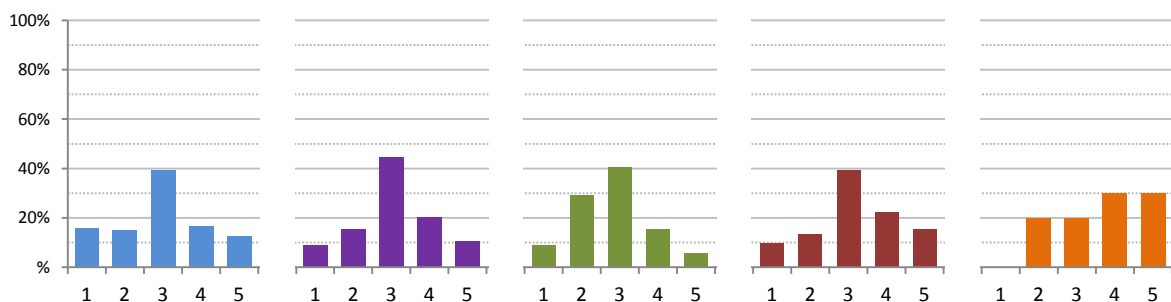
Dubious reputation of some OA publishers



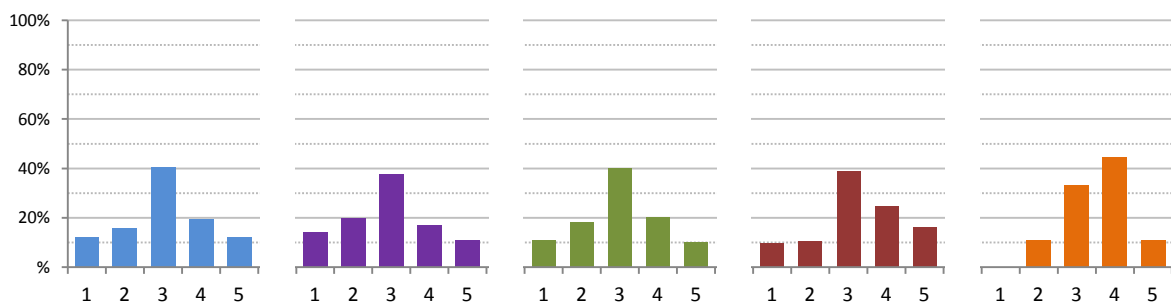
Unclear legal and copyright regulations



The need to transfer my copyright to OA publisher



Dubious and unsolid review process



Lack of visibility in leading international databases

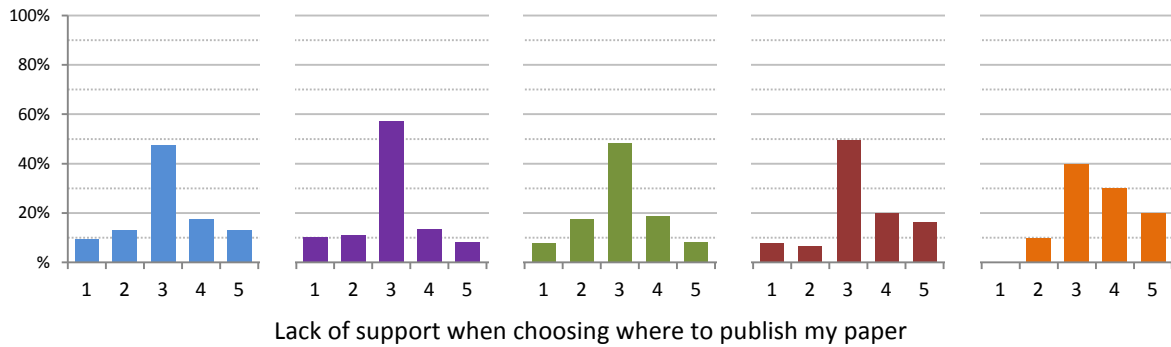


Figure 27. Level of agreement with various statements about the possible disadvantages of open access among participants from different fields (■ - SSH, ■ - SCI, ■ - ENT, ■ - MED, ■ - ART)

Another result worth mentioning is somewhat higher median values on statements related to the dubious reputation of OA publishers and unclear laws and copyright regulations. The first result is in line with the one presented above and confirms that quite a number of researchers (some 25%) believe that OA publications lack the appropriate peer review. The second result may be an indicator that OA is still a novel issue for many scholars from Serbia and that proper education and

Next two questions were also related to advantages and disadvantages of OA publishing but were focused specifically to publishing data. These two sets of statements were presented only to participants who stated that there is a practice or a requisite to publish open data in their particular research area. Total number of those participants was 161 and their distribution across subject areas is shown in Figure 28. Participants from different fields of research have more or less similar attitudes. Almost half of them (48%) seem to be unfamiliar with the open data practice. Also, there are slightly more participants who believe there is no need to make the research data publicly available than those who believe data should be shared (31% vs. 21%). Level of agreement with various statements related to the advantages of open data is very similar among participant from different disciplinary fields and hence they are not presented graphically in this report. In general, researchers agree that making data publicly available is a way to improve the transparency, replicability, and validity of research.

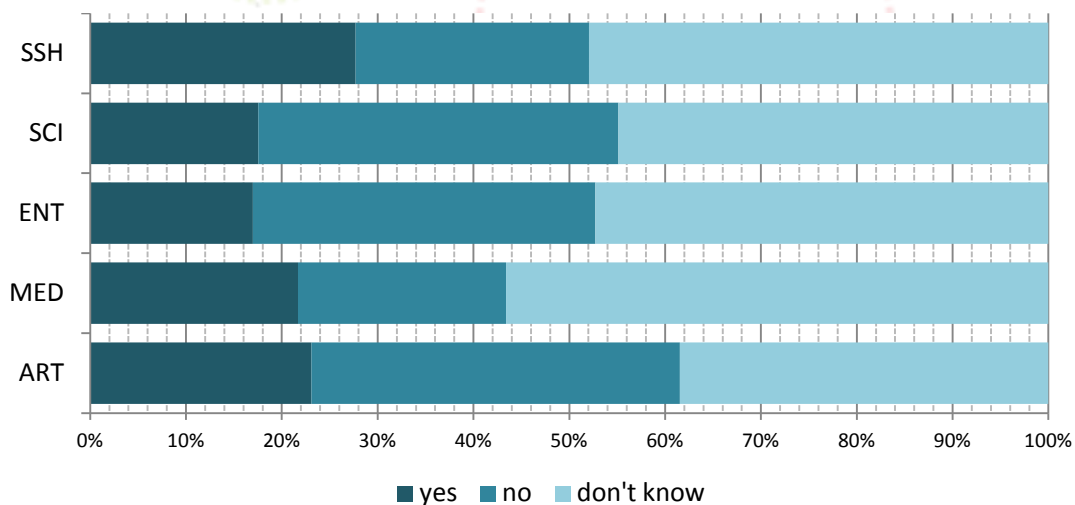


Figure 28. Percentages of answers to the question whether participants believe that there is a practice or a requisite to deposit data in OA in their subject area



When it comes to the possible disadvantages of open data practice, median values of answers for all statements were 3, which indicate participants' ambiguity and unfamiliarity with the open data practice and related procedures. However, it should be noted that the researchers in the fields of Medical Sciences are slightly more concerned with the possible misuse of their data and increased possibility for plagiarism. They also more often believe, compared to the researchers from other fields, that same data should not be used again in new research.

Next, we have asked researchers what would they consider an acceptable OA publication fee and who should pay for it. Results are presented in Figure 29. The absolute majority of participants responded that publishing articles should always be free (60%) or they didn't want to make estimation (30%). Some 10% of participants have suggested the upper limit for OA publication fees and the median of these values is 200 euros. Majority of respondents expect that OA publication fees should be paid by project funders, authors' institution or competent state authorities.

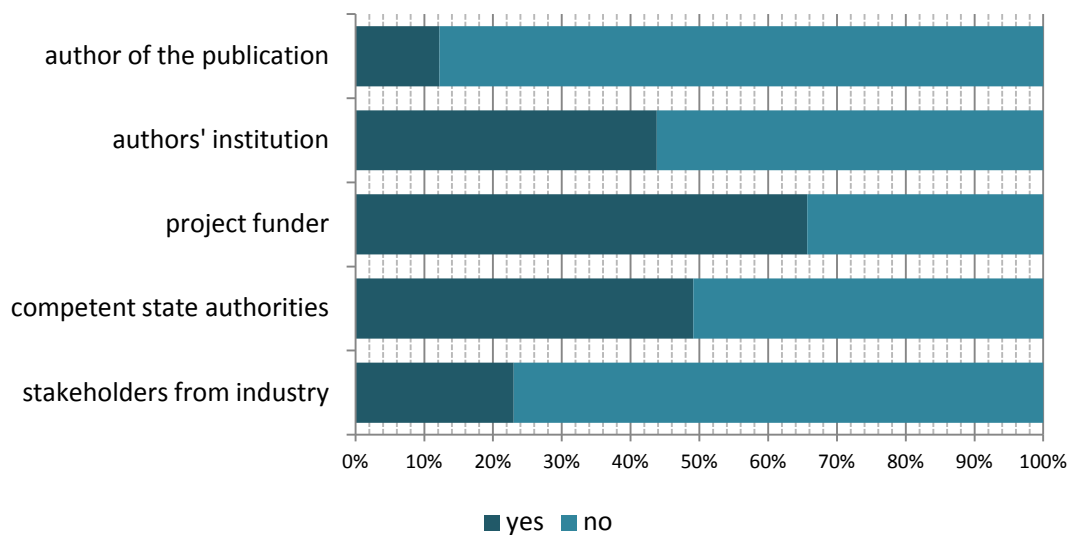


Figure 29. Who should pay for OA publication fees?

In the last block of statements, participants were asked about the issues related to national and institutional open science strategies, policies, and guidelines. Participants' responds are presented in Figure 30. In general, the majority of researcher recognized the importance of adopting national strategy on open science, as well as to establish and maintain open science repositories at the institutional level. They also expect state representatives to bargain with publishers regarding the possibility to lower publication fees. This is more a reflection of the authors' perception on who should actually be responsible for managing the implementation of open science practice recommendations, that the actual suggestion for the state representatives. This is mainly because KoBSON has already managed to bargain for a relatively suitable modality of library acquisitions, but also because Serbia, as a relatively weak economy, has the negotiating position that is far below, for example, that of Germany within their Project DEAL.

When it comes to possible mandatory aspects of open access, participants have divided opinions. It is hard to articulate a clear attitude based on their level of agreement with statements that self-depositing should be mandatory and the statement that open access publications should be valued more in research evaluation process. Yet again, it seems that possible implications of open

access and open science in general are still new and unclear to researchers in Serbia. They basically recognize the main advantages of this concept, but are rather reluctant regarding their personal involvement in it and taking the responsibility to make their research output more transparent and accessible. It should be noted though that the answers from the researchers in the field of Medical Sciences differ from this pattern since more than 50% of them have mostly or fully agreed that self-depositing should be mandatory. On the other hand, most of the participants recognize the importance of making publications resulted from publicly funded project more accessible.

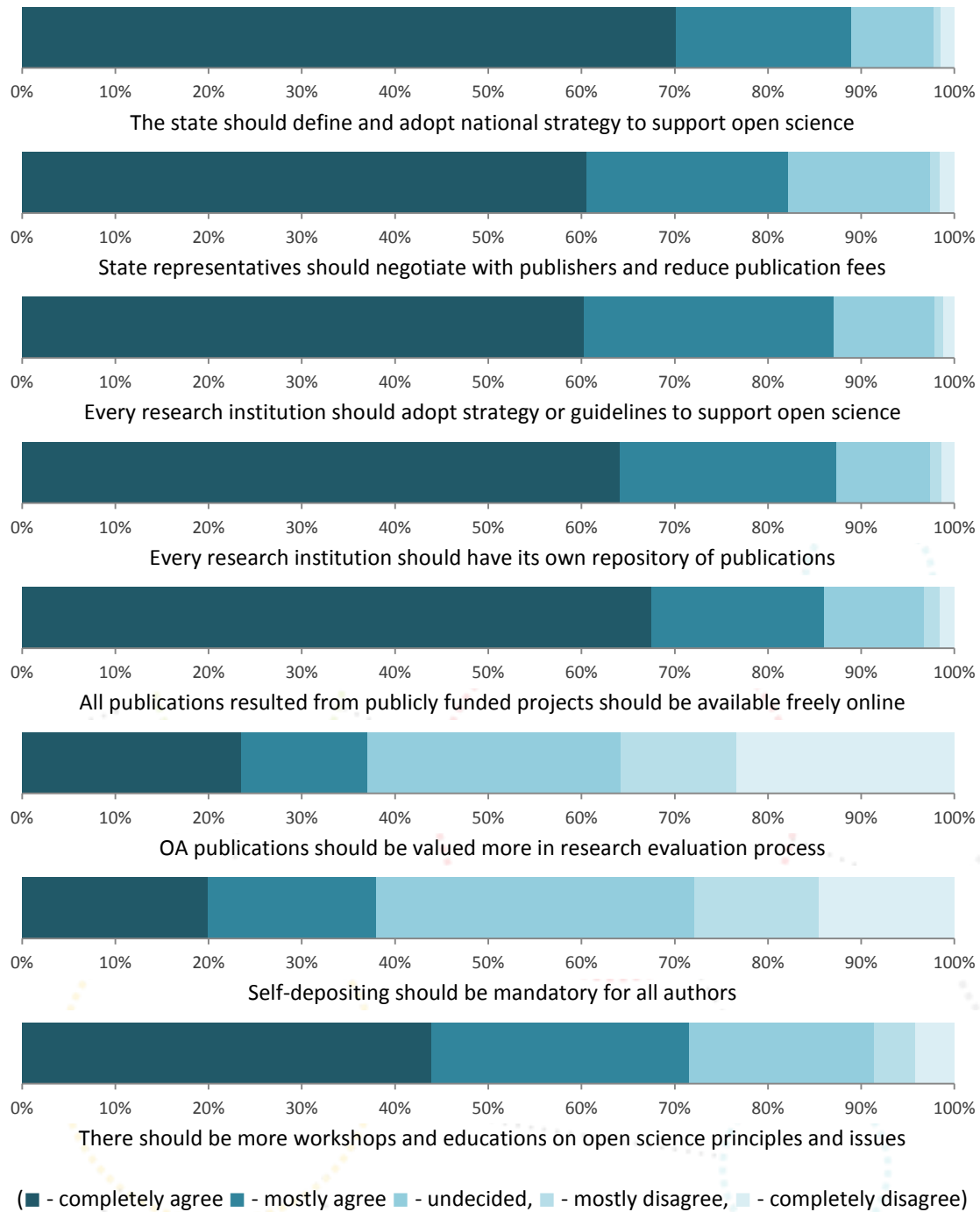


Figure 30. Participants' level of agreement with various statements regarding open access

## Conclusion

The main goal of the presented survey was to explore the Serbian scholars' experiences with open science in general, as well as to examine their attitudes towards open access practices. Approximately between 7.3% and 8.8% of the population that the questionnaire was addressed to responded to our call and completed the survey. Although such a relatively large response rate suggests that Serbian scholars are motivated to contribute to the implementation of open science practices, the results show that there is much room for improvement regarding knowledge of, and attitudes on, open science in Serbia.

Experience of Serbian scholars with open science may be regarded as modest. Only about a third of the participants participated in research projects where open access publishing was mandatory, while slightly more than a half have published in open access (only about a fifth of the participants publish regularly in open access). Although such result may have been expected given the current state of affairs in Serbian science, and therefore may not seem overly informative, its importance should not be underestimated. Namely, prior experience with open access publishing apparently affects the attitudes towards certain aspects of the procedures of OA publishing (such as the reviewing process). At the same time, specific fields of science differ considerably not only in their experience and knowledge of open science, but also in their publication behaviour, which is driven by the basic premises of their scientific disciplines. Tendency towards publishing in national journals is more pronounced in Social Sciences, Humanities, and Arts, whereby most of such publications are open access, and do not charge for publication. On the other hand, fields such as Engineering and Technology, Sciences, and Medicine, tend to favour international publications, whose procedures of open access publishing are considerably different in comparison with national publications. Therefore, such heterogeneity has to be taken into account during the process of raising awareness of open science issues in Serbian academia, and finding solutions for better visibility of Serbian scientific output.

Apparently, in their use of scientific information sources, the researchers mostly rely on public search engines (Google, Google Scholar) and a national service providing access to commercial databases (KoBSON), while the use of national and institutional repositories is far less frequent. Even the researchers' awareness of the existence of such repositories may be a challenge, since over a third of the participants stated that they do not know whether institutional repositories are established in their institutions. Having that in mind, one may safely conclude that the importance of institutional repositories is underappreciated, and that the awareness of their relevance (as one of the "pillars" of open science) should be raised.

In this survey, we assumed that researchers' motivation for adopting the open science practices is highly influenced by their knowledge of, and attitudes about, open science. The results presented in the final section of this report suggest that misconceptions are present within all scientific fields, with slight differences. Visibility and possibility of higher citedness are almost universally recognized as assets of open science. However, the researchers are much less certain regarding the "procedural" aspects of OA publishing – such as the review process, publication fees, copyright issues, etc. Although the motivation for adopting OS principles does not seem to be lacking, the dilemmas related to the process itself have to be solved in order to enhance the implementation of open science practices in Serbia.

Given a fairly modest level of experience with OS, great diversity in publication strategies and publication behaviours (including self-depositing), and the reserved attitudes towards OA, the future programs designed to boost awareness of OA issues have to be focused on enhancing both knowledge and motivation for adopting the open science practices. Apparently, raising knowledge would have to contain general information about OS, which would be complemented by the field-specific information aimed at resolving most frequent dilemmas and misconceptions present within each field. Motivation-based aspects of such programs may be facilitated by the researchers' strongly expressed motivation towards visibility of their scientific output.

