

Uptake of Open Science in information seeking practices in policy-making



Observing and Negating Matthew Effects in Responsible Research and Innovation Transition



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This deliverable summarizes work undertaken in task 5.2 “Information seeking behaviours amongst policy-makers in the age of Open Science”, aiming to assess the knowledge-base of policy-makers and how this is impacted by Open Science, via a small-scale online survey of European policy-makers, and a country case-study of the situation in Portugal via in-depth interviews. Its findings report scant evidence that Open Science significantly impacts scientific uptake. The study does, however, challenge the general notion of the “evidence-policy gap”, especially amongst our interview cohort of Portuguese policy-makers who also identify as academics.



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Executive summary

This report summarises work undertaken in ON-MERRIT Task 5.2 “Information seeking behaviours amongst policy-makers in the age of Open Science”, which sought to better understand the dynamics impacting uptake of Open Science resources. Following ON-MERRIT Deliverable 5.1, “Scoping Report: Open Science Outputs in Policy-Making and Public Participation”, which synthesised literature on how policy-makers use scholarly resources, the work reported in this document tried to further address the questions around what is frequently described as the “evidence-policy gap”, and how can Open Science impact there.

The work conducted aimed to assess the knowledge-base of policy-makers, using qualitative instruments to directly engage with policy-makers, and support information services including parliamentary libraries and ministerial resources, across all EU Member States to ascertain the levels of access to (open and closed) scientific resources, as well as information-seeking strategies of key actors, with a focus on the particular domains of agriculture, climate, and health. This was achieved via a small-scale online survey of European policy-makers, and a country case-study of the situation in Portugal via in-depth interviews with national policy-makers.

The report is structured as follows. Section 1 contextualizes and relates the work carried out on Task 5.2 and described in this deliverable with the overall objectives and activities of ON-MERRIT Work Package 5. Section 2 describes in detail the methodology used for the survey and interview design and implementation. The following sections constitute the core of the report. Section 3 details the results and findings from the survey and the interviews, section 4 summarises, analyses and discusses the main findings, and in section 5 concluding remarks, limitations and thoughts for future work are presented.

Our results show survey respondents reported using scientific information regularly to directly support their political and legislative work. However, scientific literature (primary and secondary) does not play a prominent role. Rather, policy briefs were found to be the most effective form of communication, followed by oral forms of communication. As policy-makers rely more on secondary sources and policy briefs, Open Access to the primary scientific literature is unlikely to have a huge impact on the uptake of scientific resources amongst them.

There was also a great deal of support for the concept of Open Science in general, despite the fact that the vast majority of respondents are not involved in policy-making regarding Open Science, and this valuing of Open Science was accompanied by a limited knowledge and understanding of its scope, components and concepts amongst respondents.

The results from the interviews (eight policy-makers, covering the three main disciplinary areas of concern: Agriculture, Environment and Health) clearly show that the case of Portugal is special in many ways, even if some of the findings corroborate existing literature on information-seeking by policy-makers. What marks Portugal out in this respect is largely explained by the fact that policy-making in Portugal is not considered a career, and many policy-makers are former academics, who maintain close ties with academia, where they will probably return after serving in political roles.

The interview results suggests that in Portugal connections between policy and academia are strong, that policy-makers are often able to search for, find and use scientific information (including primary literature),

which they consider key for developing policies, and make use of several procedures of expert consultation, involving, but not limited to, academic institutions. Open Science was considered by all the interviews as beneficial to science and society at large, even while some reservations were expressed regarding data literacy and IPR issues as being potential pitfalls of the Open Science transition.

In summary, we find scant evidence that Open Science significantly impacts scientific uptake. Our study does, however, challenge the general notion of the “evidence-policy gap”, especially amongst our interview cohort of Portuguese policy-makers who also identify as academics.

The report ends up identifying possible future work, investigating how the Portuguese interview sample would compare with the scientific education- and experience- levels of policy-makers from other European countries.

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- Bernhard Wieser, who helped to gather the survey sample email addresses.
- The OpenAIRE NOADs (National Open Access Desks), Pauli Assinen (Finland), Daniel Bangert (Ireland), Ieva Ceseviciute (Lithuania), Laura Valeria Bonora Eve (Spain), and Vasiliki Koukounidou (Cyprus), for their feedback on the draft survey.
- Thomas Klebel, who assisted with implementing the survey in LimeSurvey.

1. Introduction

Work Package 5 of ON-MERRIT aims at revealing the role of Open Access and Open Science resources, as well as public engagement, in policy-making. It studies how Open Science outputs are used in policy-making and identifies which societal actors have influence in public participation in policy-making. This work will aid understanding of the uptake of scientific findings and public participation in policy-making. Whereas the work in this deliverable will address the former, the latter will be dealt with in other project outputs (*D5.3 Networks of engagement in deliberative policy-making: expert reflections on barriers to participation, forthcoming*).

Open Science has been defined as “transparent and accessible knowledge that is shared and developed through collaborative networks” (Vicente-Saez and Martinez-Fuentes 2018). It is a diverse movement to reform research through more transparent and participatory practices including Open Access to publications, research data sharing, opening research methods and processes, new means of transparent research evaluation, and the re-orientation of research to be more inclusive of and responsive to the needs of society and industry. It has been suggested that Open Science will help by making scientific resources more readily available to policy-makers and other policy actors (Olesk, Kaal, and Toom 2019; Tennant et al. 2016; Willinsky 2004). To date, however, few studies have closely examined the extent to which the enabling of access affects uptake, or the drivers and barriers which may support or confound such use.

ON-MERRIT Deliverable 5.1, “Scoping Report: Open Science Outputs in Policy-Making and Public Participation” (Reichmann, Wieser, and Ross-Hellauer 2020) synthesised literature to date relevant to these issues. It found that “researchers and policy-makers are described as living in different and frequently incompatible worlds. Policy-makers seek information that is timely, relevant, credible, and readily available. They struggle with knowledge management and appraisal of research outputs, in addition to a lack of resources, knowledge, and skills to utilize research. Research awareness is low, and few academics participate directly in the policy process. Factors conducive to research uptake are access to relevant and clear information and good relationships between researchers and policy-makers, as policy-makers prefer receiving information through personal networks rather than academic publications. The reviewed literature suggests that the availability of information in the form of academic publications and other research outputs is of secondary concern” (Reichmann, Wieser, and Ross-Hellauer 2020, 8).

This current work, a summary report of work undertaken in ON-MERRIT Task 5.2 “Information seeking behaviours amongst policy-makers in the age of Open Science”, aims to better understand the dynamics impacting uptake of Open Science resources. It aims to assess the knowledge-base of policy-makers, using survey and interview instruments to directly engage with policy-makers, and support information services including parliamentary libraries and ministerial resources, across all EU Member States to ascertain the levels of access to (open and closed) scientific resources, as well as information-seeking strategies of key actors, with a focus on the particular domains of agriculture, climate, and health.

Following this Introduction, section 2 describes the methodological approach used for the design, implementation and analysis of the survey and the interviews, from the sample construction to the data analysis. Section 3 presents the results and findings from the survey and interviews, while section 4 summarises, analyses and discusses the main findings. Finally, on section 5 concluding remarks, limitations and future work are presented.

2. Methodology

In this section we describe the survey and interview design, methodology, and implementation.

2.1. Survey methods

The overall aim of the survey was to understand information seeking strategies used by policy-makers (i.e., parliamentarians, ministers and secretaries of state) in the key areas of Agriculture, Climate, and Health across all European member states, and to understand their general awareness of and opinions on Open Science topics.

2.1.1. Sample construction

Our target population were Members of Parliament, ministers and secretaries of state in the key areas of Agriculture, Climate, and Health from European countries (EU-27) plus the United Kingdom.

To construct a sample of email contacts to whom to address the survey, a search protocol was followed to find contacts using web search for “[name of country] parliament”. Accessing the Parliament’s website, the above-mentioned Commissions: Agriculture, Climate and Health, or similar (e.g., Environment instead of Climate) were searched, to identify constituent members. All websites were used in their English version, except for Slovakia where we relied on automatic translation.

The following data, publicly available on the governmental websites, was collected into an Excel spreadsheet: Name of parliamentarian; Email contact; Organization; Commission (Agriculture, Climate, and Health - if applicable); Country, for each of the 28 countries that constituted our sample: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, The Netherlands, and United Kingdom. This data was collected between May and July 2020. In February 2021 contacts from Croatia, previously unavailable because of elections taking place, were added to the sample.

All contacts from Portugal and approximately half of the contacts from Slovenia were unavailable through these countries parliament’s websites, the form of contact being a generalist online form (citizen’s mail).

As many times the same person was listed in more than one Commission, data cleaning in the form of de-duplication of contacts was undertaken before adding them to the survey sample.

This led to a final sample of 2914 policy-makers: Members of Parliament, ministers and secretaries of state.

2.1.2. Survey instrument

Our objective was to understand the information-seeking behaviours of policy-makers, especially the extent to which they make use of Open Science resources such as Open Access publications, and to what extent these resources are integrated into their decision-making processes.

Starting from these research questions we developed a survey consisting of three main sections:

1. **Demographics:** The first section sought a mix of demographic information, (e.g., country, age, gender, education level) and more specific aspects, which may potentially influence information seeking behaviours, such as education level, knowledge of languages, political party and area of policy.
2. **Information-seeking behaviour:** With the section on information seeking behaviours, we aimed at discovering which types of documents are used by policy-makers, including primary scientific literature such as journal articles, research monographs, secondary scientific literature such as systematic reviews and literature reviews, policy documents from international organizations (e.g., EU, OECD, WHO) or national governmental/ state organisations, policy briefs, and commissioned studies. In addition, we asked which sources they used to find information, including web search engines, libraries (national, academic, parliamentary, ...), organisational websites (whether international, national, civil society, corporate or industry), as well as via formal or informal consultation exercises with experts and stakeholders.
3. **Attitudes towards Open Science:** Finally in the third section of the questionnaire we asked about respondents' familiarity with Open Science concepts; their levels of involvement in Open Science policy-making; and the frequency with which they used a range of strategies to inform the policy-making process, including the commission of public engagement exercises or Citizen Science initiatives, request for Open Access to publications and data, engagement with advisory boards or host of open deliberation processes at parliament (e.g. "Enquete" commission, public consultations, public hearings, conferences).

The survey had 18 closed questions, a target completion time of approximately 15 minutes and was written in English.

2.1.3. Ethics and informed consent

Before starting the questionnaire, participants were informed about the purpose of our study and the ON-MERRIT project in general. There was also an explanation as to how the data would be gathered and the uses given to the data collected in the questionnaire, including that data provided would be treated confidentially and used only for research and report purposes, without any possibility of identification as to who provided it. The possibility to withdraw was also given and an email contact provided in order to clarify any questions that could arise.

2.1.4. Pre-testing of the survey

The questionnaire was pre-tested with a special focus on the comprehensibility of the questions, difficulties that respondents might have with their task, technical problems with the questionnaire, and the duration of the questionnaire completion.

There were two rounds of pre-testing, the first by the project partners and the second by selected people from the OpenAIRE (National Open Access Desks), close to their governments and from Countries in Northern, Eastern, Western and Southern Europe: Pauli Assinen (Finland), Daniel Bangert (Ireland), Ieva Ceseviciute (Lithuania), Laura Valeria Bonora Eve (Spain), Vasiliki Koukounidou (Cyprus). The feedback was collected through a google form and incorporated into the final version of the survey.

The main changes made as a result of this feedback were on the consent form, in order to make sure survey participants were fully aware of the way their information would be used; on changing some mandatory questions to non-mandatory (age, level of education); on adding to the purpose of the research that the results will be used in making recommendations; on the length, time of completion, length of the sections and comprehensibility of the questions.

In addition, co-creation activities were conducted whereby a pdf version of the survey instrument was made available via Zenodo¹ and news of it disseminated via the ON-MERRIT social media channels along with a link to a feedback form in order to seek broader stakeholder feedback on instrument design. Although there were 71 views and 35 downloads from Zenodo, no feedback was received.

2.1.5. Process and timeline

The survey was administered via the LimeSurvey tool hosted at the Know-Center, in accordance with the ON-MERRIT Data Management Plan. Initial invitations were sent on the 4th February 2021 with a deadline for completion of 28th February 2021. A low initial response rate led to extending the deadline until the 30th April and sending reminders on the 21st February, the 1st March and the 9th April.

Responses to the survey were anonymized. Each participant received a personalized token and could save and resume partially finished surveys.

Due to the fact that we had no email contacts from parliamentarians in Portugal and for approximately half of the parliamentarians from Slovenia, we duplicated the survey in order to send a general link through these country's parliament's websites online forms (citizen's mail), asking them to register in order to receive a personalised token to fill in the survey. Although the anonymization of respondents of the survey was guaranteed, we had little participation in this second instance of the survey (3 full responses).

2.1.6. Responses and limitations

The survey received a total of 38 full responses. 6 further responses were almost completed (except for the final section on Open Science) and are included in our analysis. Hence, we consider 44 responses for the sections Demographic Characterization and Information-seeking Strategies, and 38 responses for the section on Open Science.

¹ <https://zenodo.org/record/4452787>
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This response rate (1.5%) was disappointing, but, apart from a general “survey fatigue”, it is attributed largely to the extraordinary times in which the survey was distributed, where policy-makers were known to be very busy dealing with the ongoing COVID-19 pandemic.

Other factors that might explain this are that the contacts were collected between June and July 2020 and the survey was launched in February 2021; on the one hand, this allowed the inclusion of one country that would otherwise have been left out (Croatia, which had zero contacts in 2020), on the other hand, some of the contacts were likely no longer active, especially where elections were held in the interim. Here it may be the case that some parliamentarians may have either left parliament or changed portfolios, or were too busy with electoral processes to participate in our study. Finally, we can speculate that these administrative email accounts are many times either managed by assistants or strongly-filtered by parliamentary IT departments, and for these reasons the emails also did not reach their addressees.

This low response rate negatively influences the generalisability of our findings, but nonetheless we consider it useful to present the results and consider them as indicative evidence. It also reinforced the relevance and importance of conducting interviews and accordingly significant effort was transferred to that task.

2.2. Interview methods

To complement the survey, in-depth interviews with policy-makers were conducted to shed more light on the role of closed and Open Access scientific outputs as a knowledge basis of policy-making, as well as ascertaining attitudes towards and experiences of policy-making via Open Science practices across political actors. In order to be able to focus these interviews in sufficient depth, it was decided to take a case-study approach and target just one country, rather than the much broader sample targeted with the survey (comprising a significant number of contacts from 28 countries - i.e., geographically dispersed, with a large number of different institutions involved, differing national and subnational contexts, and probably varied cultures of knowledge acquisition). In line with available project resources, 8 interviews were conducted.

The choice of Portugal as a case-study partly reflects in-depth knowledge about the country. The main authors of this study are Portuguese and very familiar with the Portuguese political context, and were therefore able to leverage via existing contacts to convince policy-makers to take part. And the high level of people (6 members of Parliament and 1 member of government) who got interviewed confirmed that expectation.

But Portugal also offers an interesting case-study because of its political context. To begin with, Portugal is one of 14 EU countries with a single-chamber Parliament (the others being Bulgaria, Cyprus, Denmark, Estonia, Finland, Greece, Hungary, Latvia, Lithuania, Luxembourg, Malta, Slovakia, Sweden). It is interesting to notice that the 28 EU+UK countries are split evenly between single-chamber Parliaments and bicameral ones (Austria, Belgium, Croatia, Czech Republic, France, Germany, Ireland, Italy, Poland, Romania, Slovenia, Spain, The Netherlands, United Kingdom). It is also worth noting that all the countries with single-chamber Parliaments, like Portugal, are “small” (up to 10 million inhabitants), while the majority of the countries with double-chamber Parliaments are, with some exceptions, medium to large countries (with more than 10 million inhabitants).

Using a country with single chamber Parliament for our case-study was seen also as a potential advantage, as the legislative and decision-making process is, in principle, simpler and clearer, compared with countries where more than one body is involved in the process.

Another contextual aspect to consider regarding Portugal is that, like some other countries in Southern Europe (Cyprus, Greece and Spain) Portugal only established a fully democratic and parliamentary regime during the 1970s (in 1974 for Portugal), and joined the EEC/EU during the 80's (1981 for Greece, 1986 for Portugal and Spain and 1990 for Cyprus). In the case of Portugal this has resulted in the establishment of an almost totally new group of political parties, as well as a discontinuity of "political staff", including the Parliament members, since those who took power at this time had previously been outside the ruling system (and in some cases had been imprisoned or in exile, cf. Macedo and Serfaty 2019). At least in Spain and Greece, this is also partially the case (Pridham 2016).

The Portuguese Parliament, the Assembleia da República, represents all Portuguese citizens and is formed by a single chamber of members (unicameral). Along with the other bodies - the President of the Republic, the Government and the Courts - it exercises sovereign power and is the main legislative body, the basis for forming the Government and is responsible for scrutinizing the activity of the Government and the Administration and for ensuring compliance with the Constitution.

Members of Parliament represent the entire country, not just the citizens of the constituency from which they were elected. Their term of office is four years, corresponding to a Legislature.

Currently, the Assembly of the Republic is composed of 230 Members of Parliament, who are elected by lists presented by parties, or coalitions of parties, in each constituency. The conversion of votes into mandates is done according to the system of proportional representation. The Members elected by each party or coalition of parties may form Parliamentary Groups.

In the current Legislature, there are seven Parliamentary Groups and one single Member representing a party, corresponding to the political parties that elected Members in the legislative elections held on October 6, 2019. In February 2020, the single Member representing LIVRE became a "non-attached Member" and in June 2020, a Member of the Parliamentary Group of PAN also became a "non-attached Member".

1. Socialist Party (PS) - 108 Members
2. Social Democratic Party (PSD) - 79 Members
3. Left Party (BE) - 19 Members
4. Communist Party (PCP) - 10 Members
5. People's Party (CDS-PP) - 5 Members
6. Nature Party (PAN) - 3 Members
7. Ecologist Party "Os Verdes" (PEV) - 2 Members
8. Chega Party (CH) - 1 Members
9. Liberal Initiative Party (IL) - 1 Member
10. Free Party (L) - 1 Member

2.2.1. Participant selection

Although we narrowed the interview sample down to one country, we increased diversity by targeting parliamentarians, members of the government and support staff, engaging departments responsible for

Agriculture, Climate, and Health, with the goal of a diverse sample in terms of gender, age, role, area of policy, and in the case of the members, political affiliation.

In order to do so, we screened the contacts from Portugal gathered for the survey and selected a group of 14 people who were contacted via email. The selected group was gender-balanced (7 male and 7 female) and reflected the proportion of seats in parliament including 1 member of the Government and 13 members of Parliament from the following political parties: PS (Socialist, 3), PSD (Social Democrats, 2), CDS (Christian Democrats, 2), PCP (Communist, 2), BE (Left, 2), PEV (Ecologists, 1), PAN (Nature, 1).

We included Members of Parliament with responsibilities in the permanent Commissions responsible for the areas of Agriculture, Climate and Health, which in the Portuguese Parliament are Agriculture and Sea; Environment, Energy and Land Management; and Health Commissions.

As for the Government, due to the pandemic situation and the low probability of getting an interview with a minister or secretary of state, we chose to only contact the Ministry for the Environment and the Ministry for Territorial Cohesion.

From the policy-makers contacted, 7 agreed to be interviewed: 1 from BE (Left), 2 from PCP (Communist), 2 from PS (Socialist); 1 from CDS (Christian Democrats); and 1 Secretary of State. During the course of one of the interviews it was possible also to get the contact from an Advisor working for one of the Parliamentary Groups, who also agreed to give us an interview. Despite it being a small sample, we were able to recruit high rank politicians: 1 Secretary of State, 3 Parliamentary Group coordinators and 1 president of a Commission.

Our final participants group consisted of 8 people in total (4 men, 4 women). However, the final group of interviewees cannot be said to be fully politically representative since, despite all efforts taken, we could not obtain an interview with any member of the second largest party (PSD) and also no member of another small party (PAN). Overall, the group of interviewees is skewed to the left of the political spectrum.

2.2.2. Interview design

The interviews were designed to be brief, with a maximum duration of 30 minutes, due to time constraints on the part of the interviewees, aiming to deepen our understanding of how and to which extent policy-makers use scientific information and take up freely available scientific resources (Open Science resources), such as publications, and the ways in which these resources are integrated into their decision-making processes to back up their political decisions. Additionally, we hoped to understand their general familiarity and opinions on Open Science and identify any barriers and challenges that might prevent the uptake of these resources.

We used semi-structured interview guidelines developed to mirror the structure and foci of the survey instrument but with added flexibility for open questions. Following Gill et al., this approach enables flexibility especially in “the discovery or elaboration of information that is important to participants but may not have previously been thought of as pertinent by the research team” (Gill et al. 2008). The interview guidelines are included as Annex B at the end of this document.

First, we asked the participants to briefly introduce themselves, their background, previous experiences and present duties in the Parliament/ Government without guidance. This allowed them to feel comfortable as we progressed into the information-seeking strategies and behaviour in looking for information to back political decisions: where do they look, who do they consult, what kind of documents are used, and the factors that may influence decisions. They were also asked about practices such as public engagement, public consultation and hearings to make the transition towards Open Science topics. The last part of each interview was focused on attitudes towards Open Science - understanding, familiarity and opinions, and their views on benefits, challenges and risks.

2.2.3. Data collection

The 8 interviews took place in March (6), April (1) and May (1) 2021. All interviews were held in Portuguese.

Due to COVID restrictions and scheduling convenience, the interviews were conducted online using the secure Zoom video conferencing tool.

Similar to the survey, participants were informed about the scope of the study, given the assurance that all data and information would be safely stored, that their answers and the information provided would only be used in an anonymous way for reporting purposes, and gave their permission to be recorded (sound and image). All sound recordings (in Portuguese) were professionally transcribed for the data coding and analysis phase. After the data coding and analysis, the most relevant sections were translated to English.

2.2.4. Data analysis

Using a qualitative approach modelled on the framework approach set out in Gale et al. (2013), a thematic analysis was performed. At the pre-analysis stage, a first hearing of the audio recording of the interviews was carried out. Then, a first reading of all transcribed interviews was performed in order to have a general picture of the corpora to analyse.

From that reading a first set of codes was produced according to the main sections of the interviews - personal background, information seeking practices and opinions on Open Science - and the most recurrent topics mentioned by the interviewees, e.g.

- “democratization of knowledge”; “knowledge for an elite”; “access to knowledge”; “democracy”; “public funding of science”; “access to information as a human right”;
- “acquisition of knowledge”; “information literacy”; “informed political decision”; “credible sources of information”; “fundamented opinions”;
- “cost of education”; “knowledge as valuable asset”; “intellectual property”; “patents”;
- “public hearings”; “formal consultation processes”; “parliamentary journeys”; “networks”; “lobbying”; “reports”; “party's doctrine”; “citizens consultation”; “stakeholder's consultation”; “science cafes”
- “fake news”; “media”; “information overload”; “news monitoring service”

A team of two people coded the interviews independently and deliberated on the main categories under which the interviews could be classified.

In a second, more in-depth reading, new codes were added to the first ones, namely the ones that were mentioned by the interviewees when speaking as researchers, e.g., “metrics for researcher evaluation”; “impact of research”; “citations”; “transparency of research”; “scrutiny”; “collaboration”; “career progression”.

These occurrences of each of the themes were registered in an excel spreadsheet, as well as notes and interesting quotes from the interviewees. This registry of occurrences took into consideration, not only the explicit, but also the implicit ones.

These codes were then analysed and grouped into a list of themes and the whole dataset was analysed again in order to test and improve them. This allowed us to interpret the data from the interviews.

3. Results

3.1. Survey

3.1.1. Demographics

The survey received a total of 38 full responses and 6 partial responses, wherein sections one and two were completed but not section three. Therefore, a total of 38 responses are included in our presentation of the findings from section three, whereas 44 responses are included in the presentation of findings for sections one and two. Respondents come from 16 countries, as demonstrated in Table 1.

Table 1 Number of respondents per country

Country	No. participants
Austria	5
Belgium	1
Croatia	2
Czech Republic	2
Estonia	1
Germany	1
Greece	4
Rep. Ireland	3
Italy	2
Latvia	2
Luxembourg	2
Poland	4
Portugal	7
Slovenia	4
Spain	1
Sweden	3
Total	44

Our sample population is balanced in terms of gender with equal responses from men and women. All respondents are over the age of 30 and show relatively even distribution of age (see Figure 1). They are also highly educated: the vast majority of respondents (82%) have completed a postgraduate degree (see Figure 2). In addition to their native languages, all but one respondent are comfortable reading in English (only one is a native English speaker). Additionally, a third of the respondents are comfortable reading in French. Therefore, overall, our sample can be described as gender-balanced, geographically and linguistically diverse,

highly-educated and proficient in English. These latter characteristics point to a sample drawn from the elite population within Europe.

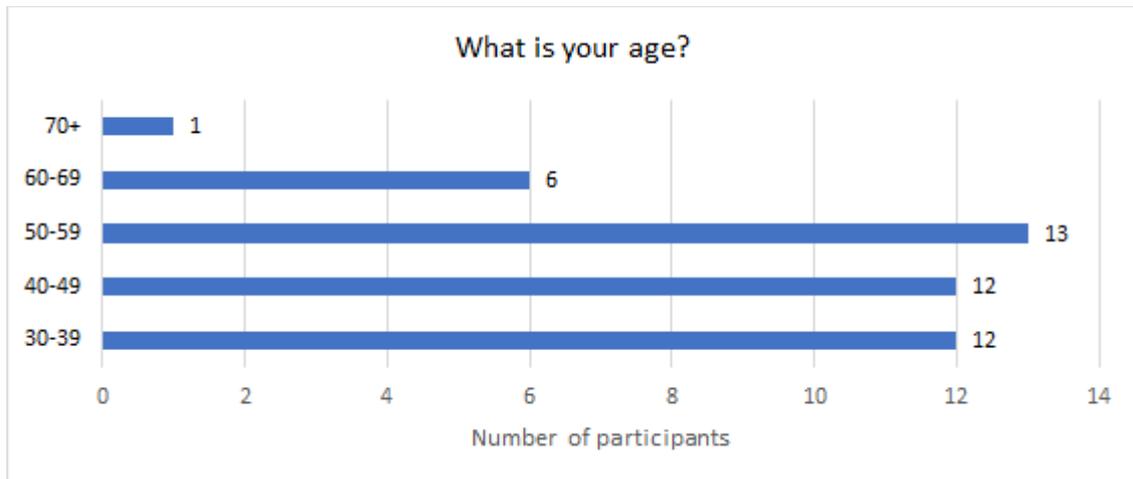


Figure 1 Age distribution

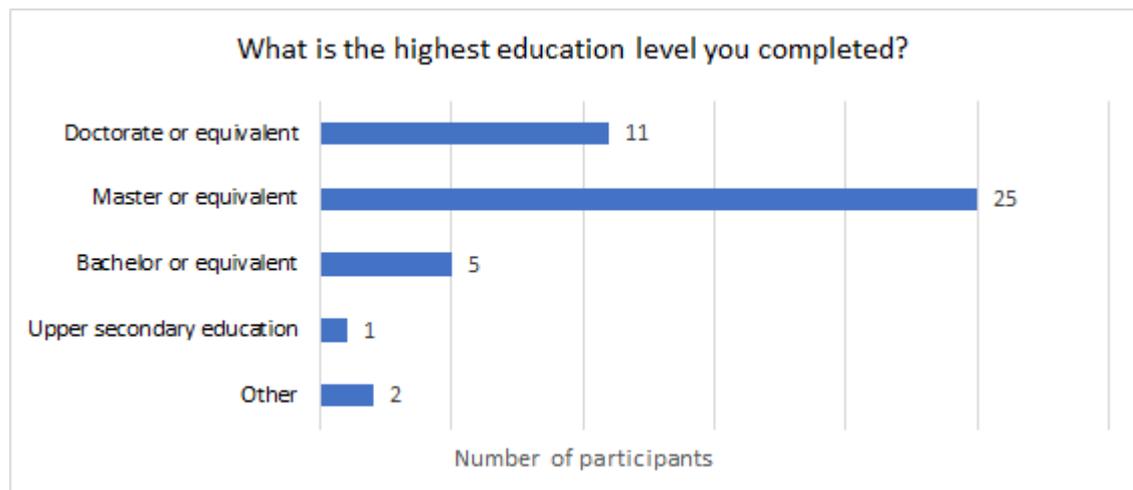


Figure 2 Education level of respondents

The majority (61%) of respondents are political representatives (26 Members of Parliament and 1 member of government), while 32% (14) are policy officers or supporting staff of political representatives and 7% (3) responded “Other” (one senior manager within the parliamentary administration, one policy worker at an independent institute supporting the government and different ministries, and a third not specified) (Figure 3). Overall, 32 respondents worked in Parliaments, 8 in governments, 3 at political parties, and 1 not specified.

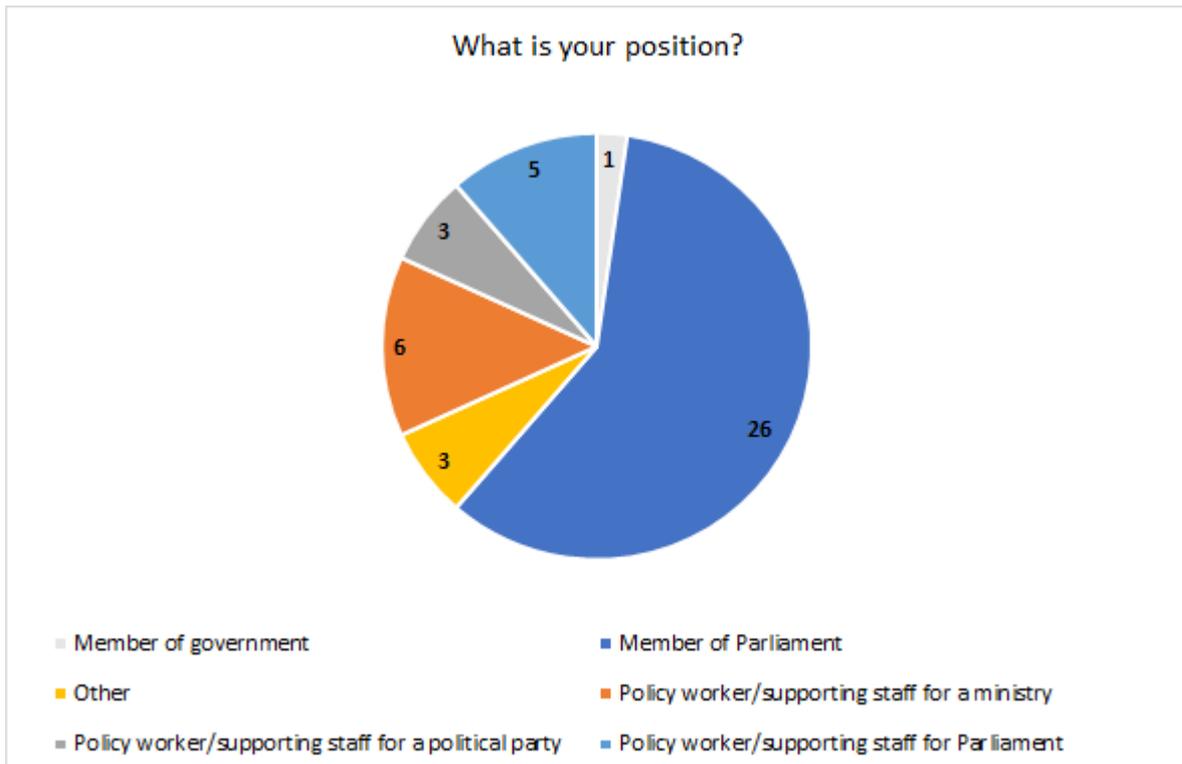


Figure 3 Respondents' roles within policy-making

To characterize the position of respondents on the political spectrum, and considering the strong diversity of the political landscape and party designations across the countries, we asked for respondents' political affiliations according to their membership of the political groups of European Parliament. However, more than a third of respondents (39%) declined to provide this information. Those who had indicated their political family were spread across all political groups (Figure 4).

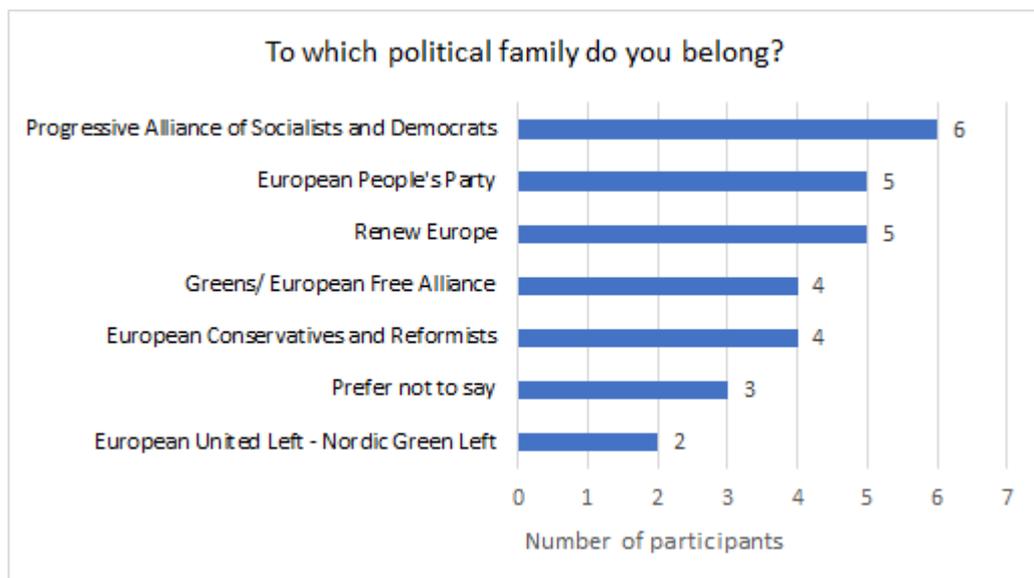


Figure 4 Political family of respondents

Respondents are active in a diverse array of policy areas. Health (16), Environment and Climate (23) and Agriculture (10) are heavily represented, in line with our sampling strategy of targeting policy-makers responsible for these portfolios (Figure 5).

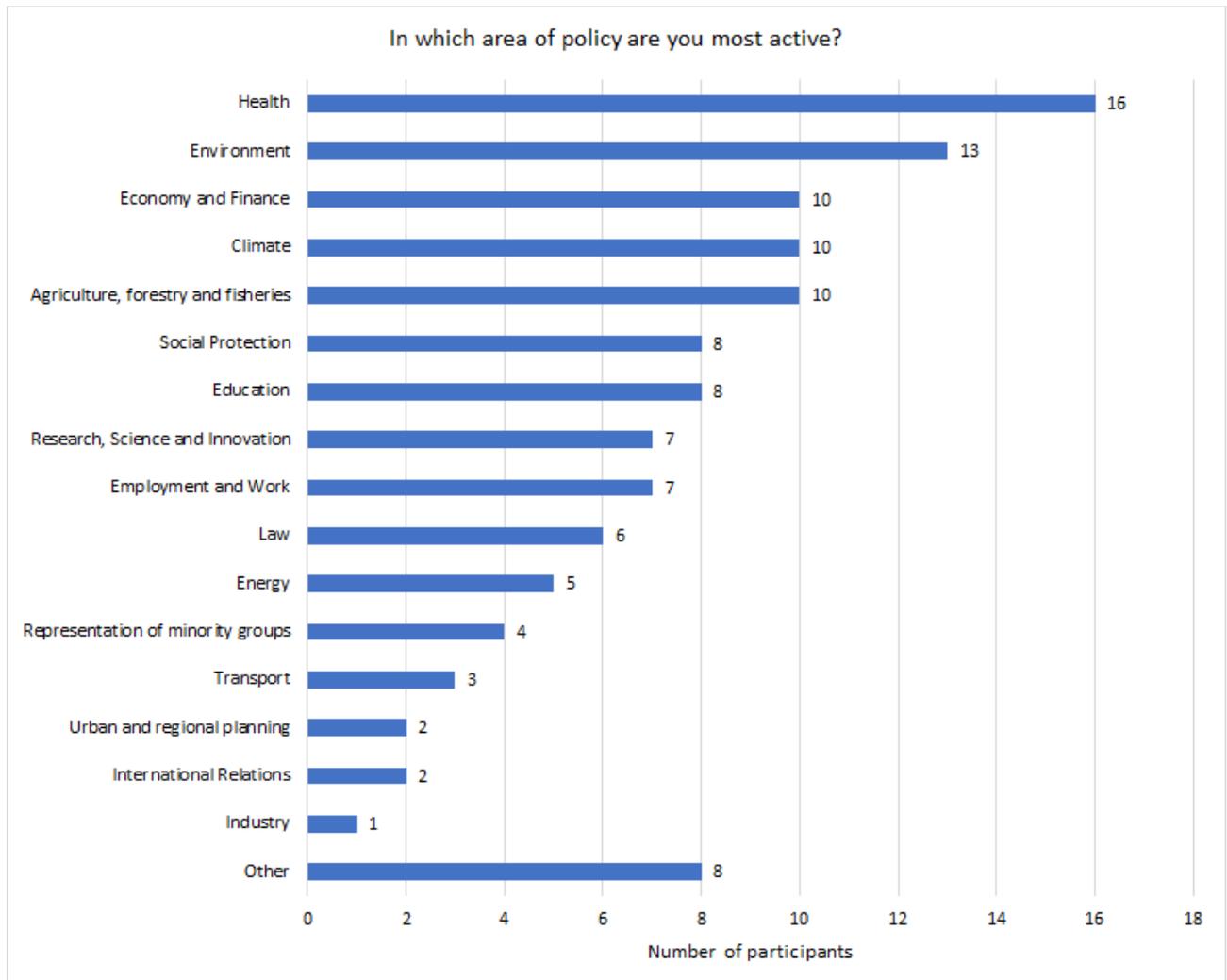


Figure 5 Policy area of respondents

3.1.2 Information-seeking behaviour

The majority (62%) of respondents frequently (23% always and 39% often) use scientific information to support their decision-making, political or legislative work, while much of the rest (34%) do so sometimes. A small minority, just 5%, rarely use scientific information (Figure 6).

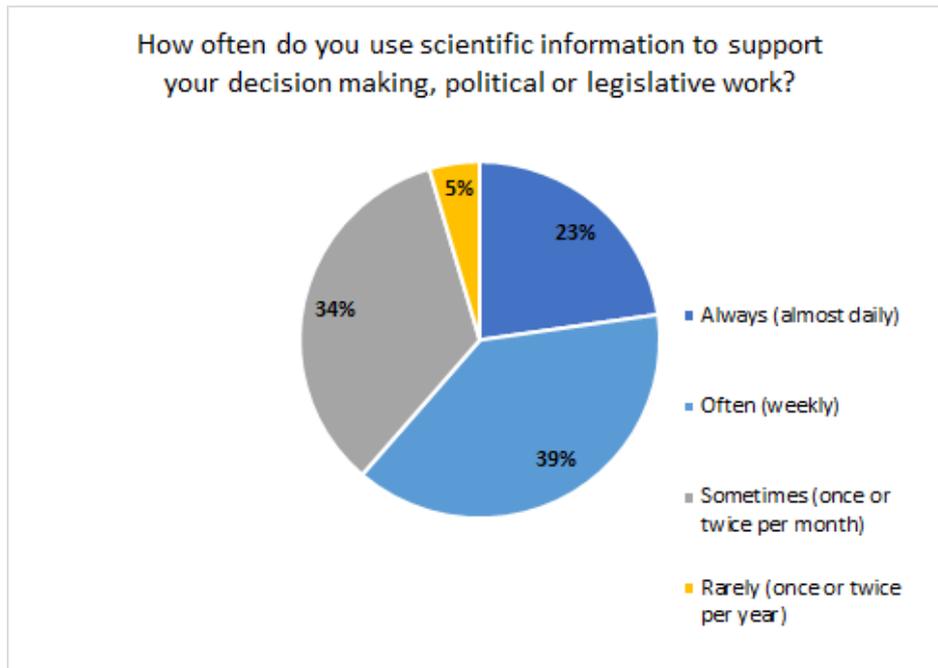


Figure 6 Frequency of use of scientific information

Our respondents showed themselves to consult a wide variety of sources. While preferred sources and frequency of use vary across the sample, the majority of respondents rely most frequently on policy documents from national governmental/state organisations (61% indicated Always or Often), and policy briefs/civil society reports (59% Always or Often). Additionally, more than half frequently rely on oral information from experts and policy documents from international organizations (55% indicating Always and Often in each case). Less-used in comparison are internally commissioned studies, primary scientific literature and secondary scientific literature, where less than half (43%) of respondents indicated using each of these sources always or often. Business reports are the least frequently used sources of information by respondents, with just 27% using them always or often (Figure 7).

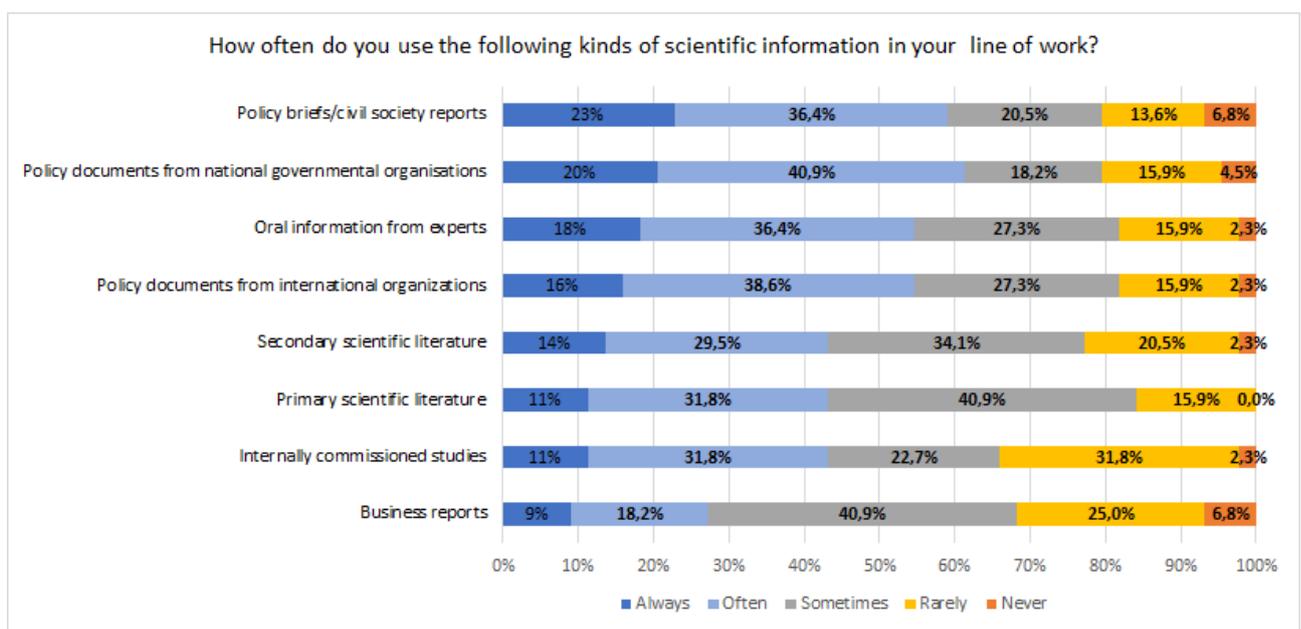


Figure 7 Frequency of use of types of scientific information

To find the information they rely on, the majority of respondents frequently use web search engines, like Google or Bing (82% report doing so always or often) and all use them to some degree. Other widely and frequently used information sources include websites of international organisations and Government websites. On the other end of the spectrum, consultations (both formal and informal) with stakeholders, libraries and websites of corporate or industry associations were less widely and regularly used by respondents (Figure 8). The less frequent use of consultations may be influenced by the pandemic and its impact on work practices and social interactions.

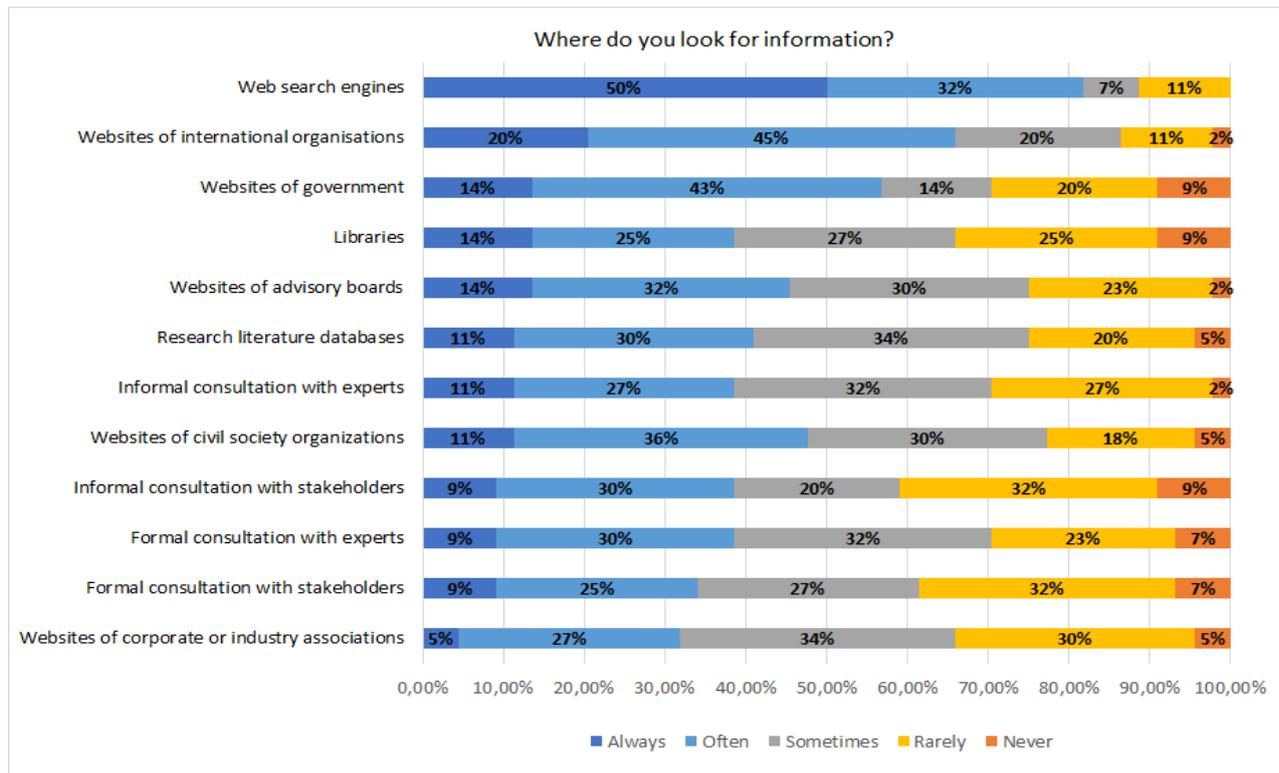


Figure 8 Sources of information

Overall, the survey results indicate that policy-makers rely primarily on the web (whether search or specific websites) to find policy documents, policy briefs and reports of various kinds. To a certain extent, they also rely on primary and secondary scientific literature, which again is probably found primarily via general web search engines but also, in some cases, through research databases.

When assessing the quality of scientific information, a majority of respondents report that the reputation of the person or institution (64%), previous experience (61%), and availability/accessibility (61%) are very important factors. In fact, all respondents consider previous experience and reputation of the person or institution as important to some degree (none ranked these as unimportant). This signals a strong reliance on what is already trusted and experienced when respondents evaluate the quality of information, as well as the importance of convenience. Relatedly, about half consider personal contacts very important. Smaller yet still substantial proportions of respondents rate relevance/usability (45%) and timeliness (43%) as very important. While only a small proportion (20%) consider being featured in the news to be very important, the majority (59%) consider it somewhat important (though it also has the highest proportion of respondents (20%) who rate this factor as not at all important, illustrating a greater divergence of opinion on this factor). Similarly, a majority of respondents consider the following factors to be somewhat important:

recommendation from a trusted colleague (68%), timeliness (55%) and relevance/usability (52%) (Figure 9). Cumulatively, these findings illustrate that first, information must be accessible and easily discoverable, and following that, the importance of trust and credibility as factors in how respondents evaluate the quality of scientific information. They rely heavily on previous experience, reputation, and personal contacts in the process of selecting scientific information to use in their work.

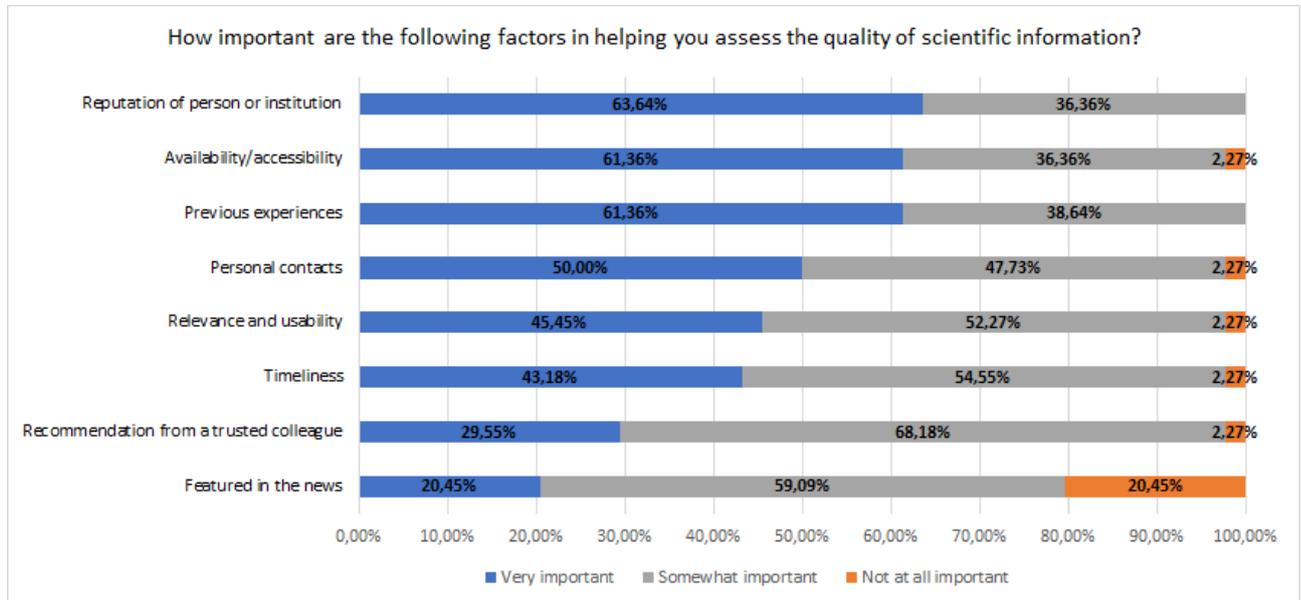


Figure 9 Factors used to assess the quality of information

Echoing these findings, respondents report that they are most likely to use scientific information when it comes from reliable research organizations (95% agree or strongly agree) and reputable peer-reviewed journals (89% agree or strongly agree), and when it is easily found online (84% agree or strongly agree) and freely available (75% agree or strongly agree).

To summarise, the majority of respondents regularly use scientific information to inform their work and they most often rely on policy documents and briefs and oral expert advice, and less regularly on primary and secondary scientific information, as sources of this information.

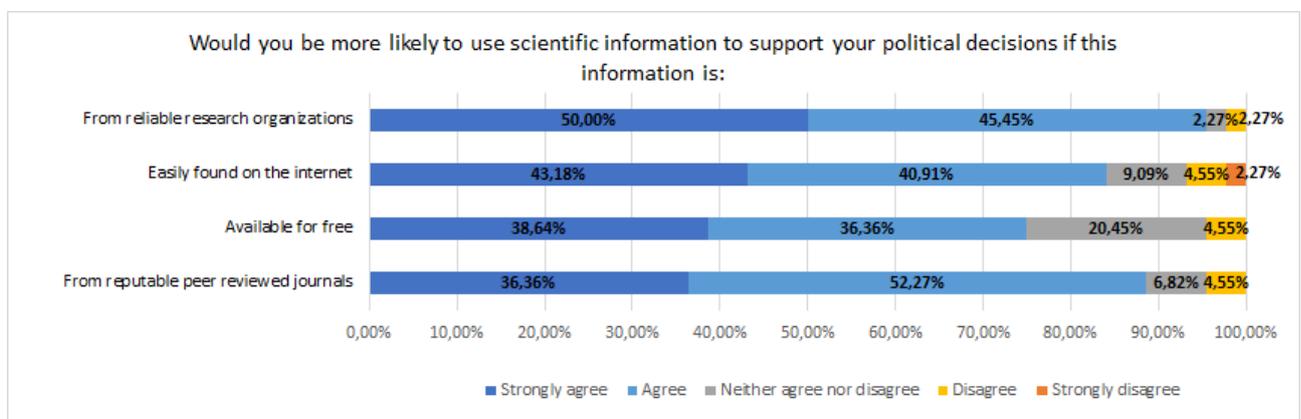


Figure 10 Likelihood of use of types of information sources

3.1.3 Open Science: attitudes and familiarity

The third and final section of the survey was about respondents' attitudes to and familiarity with Open Science and its different components and concepts. As previously stated, 6 respondents did not complete this section and so the following results are drawn from 38 responses.

Levels of familiarity with the various aspects of Open Science were generally low, with the majority of respondents only moderately or slightly familiar with various aspects of Open Science (Figure 11). The most well-known aspect, Open Data, was still only very or extremely familiar to 50% of respondents. That this aspect is more well known among respondents may be attributable to many governments having adopted Open Government Data practices (to varying degrees). Open Access and Ethics in Research were the other aspects most familiar (47% and 45% very or extremely familiar, respectively). Especially interesting here is that Citizen Science was by far the least familiar topic (less than half even moderately familiar and 32% not at all familiar).

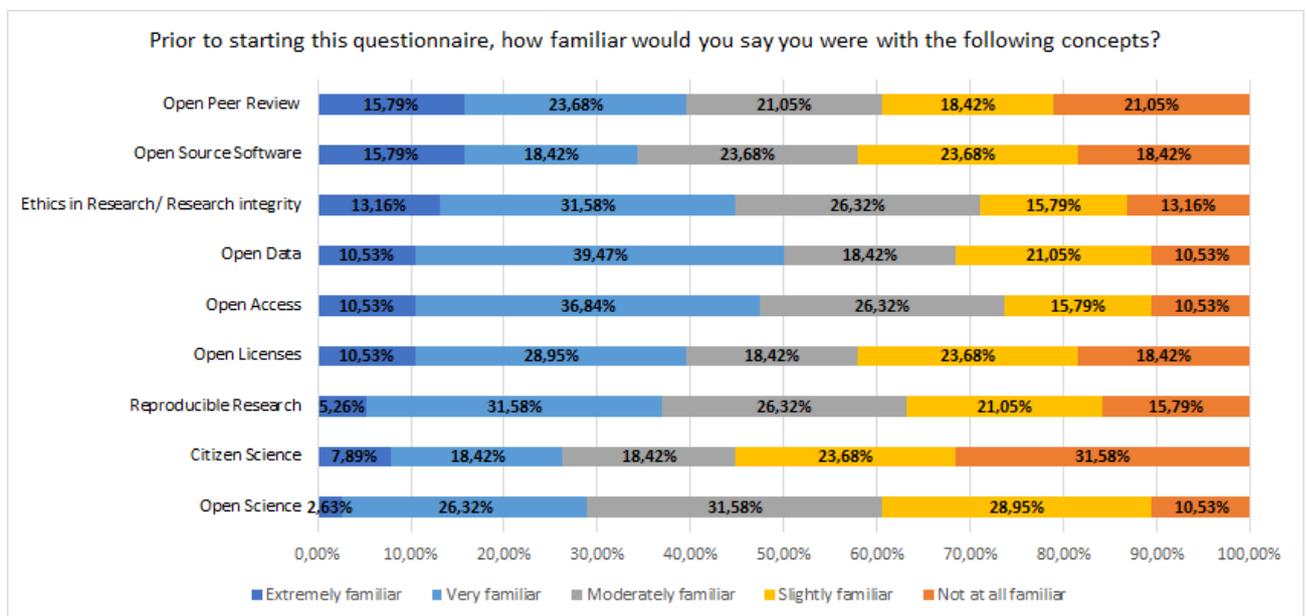


Figure 11 Familiarity with Open Science concepts

Despite this limited familiarity with Open Science concepts, respondents show overwhelming support for Open Science principles (Figure 12). The majority believe that policy should require Open Data (79%) and Open Access (74%) practices, and that there should be more active public engagement carried out by the scientific community (63%). Additionally, the majority (71%) state that Open Access and Open Science make it easier for them to find scientific information, which echoes findings reported above about the importance of accessible and freely available scientific information. In keeping with their support for Open Science practices, only a minority (37%) of respondents believe that the current system of scholarly communications works well.

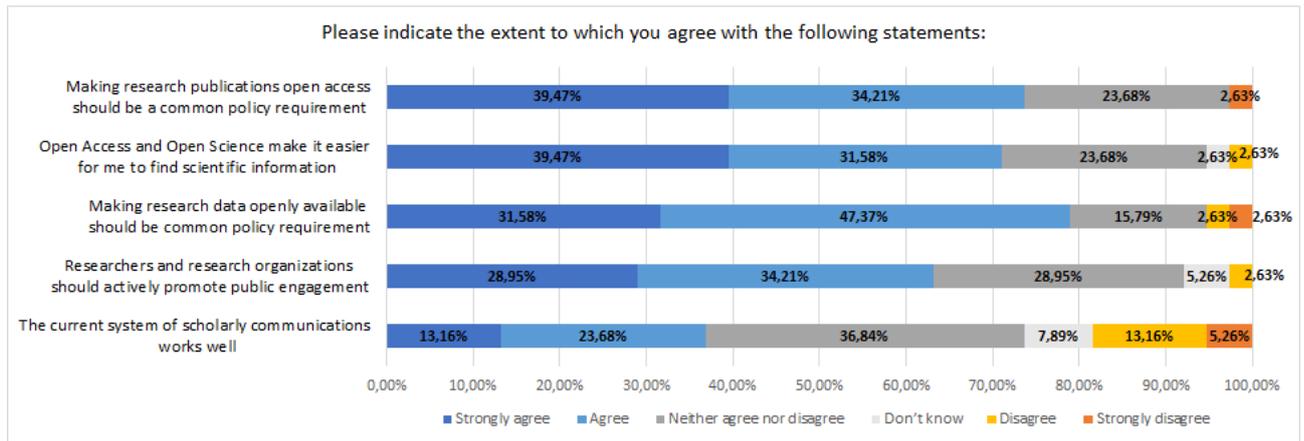


Figure 12 Attitudes towards Open Science

The majority of respondents were not involved in Open Science policy-making. Only nine were involved in Open Science policy-making at national level, while two were involved at regional level, with the same number indicating to be involved in a personal capacity.

Yet, at the same time, respondents report low uptake of Open Science practices within policy-making processes (Figure 13). The most frequently relied upon practice was the relatively traditional one of establishing or using already existing advisory boards (37% reported using always and or often). Concerning more “open” practices, initiating or hosting open deliberation processes (37%), commissioning public engagement exercises and requesting Open Access publications (32%) are the most often used practices, yet these are reported by a minority of respondents in each case. Again, Citizen Science was the most marginal practice.

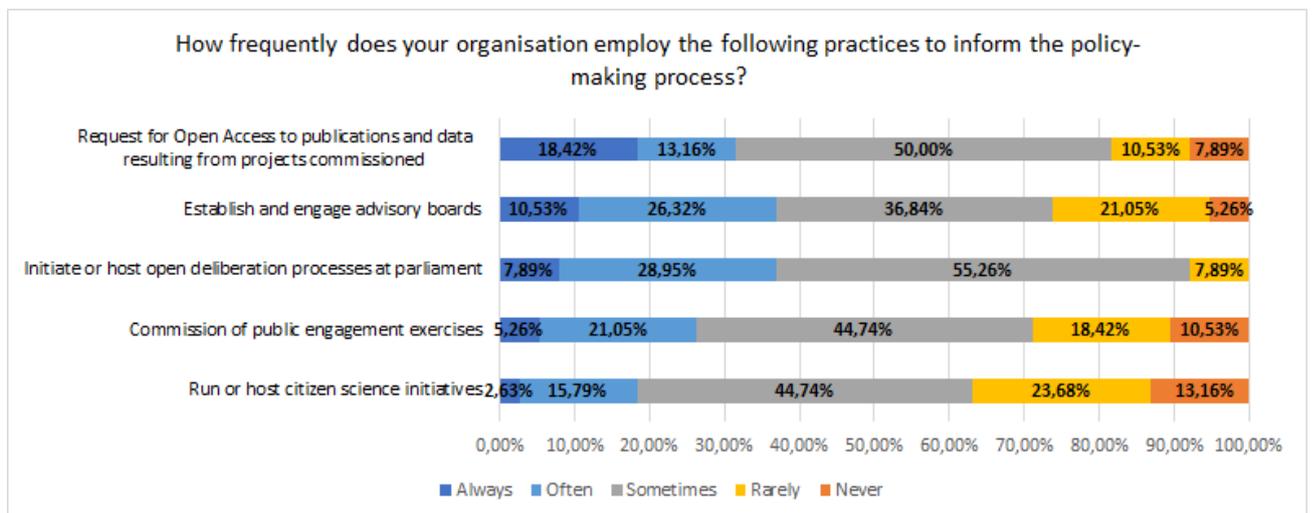


Figure 13 Practices informing policy-making

In sum, while there is overwhelming support for Open Science principles and practices and some awareness of certain aspects, including Open Access, Open Data and research ethics, both awareness and uptake of them among this sample of policy-makers is low. We reflect below upon this seeming contradiction in our discussion. First, however, we report the results from our in-depth interviews.

3.2. Interviews

As stated, our interviews focused on Portugal. From that country, we interviewed one member of Parliament Advisor and one member of Government, as well as five Members of the Parliament from different political parties: one from BE (Left), two from PCP (Communist), two from PS (Socialist); one from CDS (Christian Democrats).

All three target disciplines of particular relevance for ON-MERRIT (Agriculture, Climate and Health) were covered, as our interviewees simultaneously served in several Commissions such as Environment, Energy and Land Management; Public Administration, Administrative Modernisation, Decentralisation and Local Government; Agriculture and Sea; Education, Science, Youth and Sports; and Health. Two of the interviewees belong to the Ad-hoc Committee for the monitoring of the implementation of the measures in response to the pandemic disease COVID-19 and of the economic and social recovery process; and two belong to working groups such as the ones for the Law on Climate; General System on Waste Management; Careers of Superior Diagnostic and Therapeutic Technician and Auxiliary Health Technician; and Medically Assisted Reproduction.

The education level of interviewees was generally high, as half of the interviewees held a Doctorate (PhD) at the time of the interview, one a Master's degree, while the remaining three held a Bachelor's degree across a wide range of specialties, including Biophysics, Law, Chemistry, Geography, Urban and Regional Planning, Marine Sciences, Economics, and Education. As far as their backgrounds were concerned, a strong liaison with academia was evident, as three interviewees were former scientists and researchers, one was an instructor in a higher education institute at the time of the interview, and another two were recruited for the parliament after finishing their degree. Interviewees exhibited good knowledge of languages other than Portuguese: eight interviewees said they spoke English, seven Spanish, five French, two German, and two Italian.

Most of the interviewees reported that they search for information daily to keep themselves informed, or more specifically for specific topics whenever there is the need to present or discuss a proposal. The types of documents sought after most frequently were white papers and policy documents from international organizations (EU, OECD or WHO, for instance), white papers and policy documents from national governmental or state organisations as well as primary scientific literature (e.g., journal articles or research monographs). The starting point for the search is usually a web search engine (e.g., Google, Bing) and websites of international organisations such as those already listed.

Our sample of respondents generally professed the need to be personally well-informed regarding the evidential basis of their area of policy, usually conducting their own research (only one advised they rely on internally commissioned studies). Information to backup decisions and opinions was regarded as essential, as evidenced in the following excerpts:

“Everything I do, all the opinions I have in relation to bills that are being developed, I hope they are all knowledge based”. (Interviewee 1)

“The work of a member of parliament is all the better if it is based on his or his argumentative capacity, eloquence, oratory, and above all on the reasoning he or she brings, based either on his or

her own knowledge, or on what he or she seeks for information, or what is brought to him or her". (Interviewee 8)

In addition to the members' individual research and information gathering, at least some Parliamentary Groups host internal debates with the aim of contextualizing and understanding the topic at hand in the light of the party doctrine, to formulate a political position and to define courses of action or legislative initiatives, as stated by Interviewees 6 and 2:

"We are part of a party, a party which has a programme, which has a project and which ran as a candidate with a programme and, naturally, it is these political options that we have and not others" (Interviewee 6)

"Our reflection also takes into account our political principles, that is, we take what is scientific information, which are the facts, and then we treat it in accordance with our vision of society and what we think is correct". (Interviewee 2)

The Members of Parliament that were interviewed for this study all stated that they seek to establish regular interaction with civil society, as parliamentarians are expected to maintain intimate links to the regions which they represent to keep informed about their electorate's needs. This is achieved through regular visits and other initiatives. Interviewee 5 states that:

"Interaction with the institutions and the populations is, let's say an inherent, continuous and permanent contact with citizens, institutions and companies. (...) At district level, some debates, forums and seminars are organised with civil society, where various residents or specialists in these areas are invited to debate, and civil society is invited to participate". (Interviewee 5)

The policy process is inherently political, i.e., driven by needs and interests (Head 2015). When deciding how to position themselves in relation to a certain subject, many parliamentarians also take into consideration stakeholders' needs and opinions, relying on various methods including stakeholder meetings, bilateral discussions and analysis of stakeholder statements. As has been described in detail in our scoping report, Dodson et al. (2015) found that lobby groups are among the most trusted sources of information. Interviewees 3, 6 and 8 state this:

"We always listen to the actors we consider relevant, which are companies, local authorities, local associations, namely involving producers and the scientific and technological ecosystem". (Interviewee 3)

"If we are going for an initiative, let's imagine, on labour problems that affect health workers, we will look very attentively at what the unions, what the workers' representative organisations are demanding. (...) We do our analysis, we make this collective assessment and then we will reach a conclusion and present a proposal. (...) [we also look for] examples and experiences from other countries." (Interviewee 6)

"Meetings with stakeholders, for example patient organisations, are a good source of information, because they themselves do a lot of research work, and they are the first interested parties in getting

that information to me, obviously to influence my mental process and hopefully even my activity". (Interviewee 8)

This attempt of influence is not viewed by Interviewee 8 as something negative, even when made by companies and groups of interest, as long as the information provided is carefully "digested". This person gives an example from the health domain:

"Yes, [we receive] from associations of companies and not individual companies, for example, in the area of health, there is an association called Health Cluster which brings together the economic side of health, companies working in innovation, in devices, pharmaceuticals. They produce studies on the value of their sector, on what it may be necessary to support in the future, in which areas, and how, they send information, they ask for meetings with us in which they normally share these studies. (...) Although in Portugal there is not a registered lobbying activity, (...) groups of interested parties come to expose a problem and normally when they expose it they bring batteries of information, which must then be filtered". (Interviewee 8)

Aside from unsolicited information received by interest groups, interviewees report frequently asking experts for information. A paper by Sarah Gollust and colleagues (Gollust et al. 2017) found that policy-makers predominantly rely on personal networks for information, which suggests that being a part of these networks is indispensable to influencing policy. The relevance of networks is corroborated by Interviewees 1 and 8:

"The parliamentarians themselves also have their networks of knowledge". (Interviewee 1)

"I have already developed a network of people with whom I have a good relationship, whether they are experts or people from the field, who, when there is a... an issue coming up, or when I see a discussion coming up, I consult (...) I think they are selected based on the relationships we create, on the network we create, as MPs (...) for example, this case of health, and the COVID tests, I already know that I can talk to private laboratories, I have a contact at the INSA [National Health Institute Doctor Ricardo Jorge] who I can also talk to and ask "what is your opinion on that". Sometimes they refer studies to me". (Interviewee 8)

There is still a clear place for unsolicited policy advice in the form of policy briefs that Members of Parliament and other policy-makers receive. The relevance of writing policy briefs has been described elsewhere (e.g., Choi et al. 2016; Dodson et al. 2015; Glied et al. 2018). Our participants confirm the importance of researchers and universities sending information they consider relevant to the Members of Parliament:

"There are opinions that arrive, even unsolicited, directly to parliamentarians (...) there are many people who are very knowledgeable in a particular area and send contributions and reflections of their own work" (Interviewee 2)

"In the Parliamentary Group, we receive information sent to us - either by individual citizens or by the institutions - and we receive documents that are more summarised and systematised in terms of problems and suggestions" (Interviewee 6)

“More recently, what has happened is that the academic institutions themselves send us [publications] for some areas, the area of health and the area of education are good examples of this, they send us open publications that they have produced and that they think may be relevant for public and political decision-makers.” (Interviewee 8)

In addition to the search for information developed by the parliamentarians and this unsolicited information flow from different groups, there are other initiatives, both from the Parliament as a whole and from each Parliamentary Group, to actively collect information and engage with society. Each party regularly organizes, in different locations of the country, *Jornadas Parlamentares* (Parliamentary journeys), where Members of Parliament discuss specific topics, and visit local institutions. Interviewee 1 talks about the Parliamentary journeys saying:

“Many of the Parliamentary Groups visit research centres, (...) go to companies, go to universities”. (Interviewee 1)

In a second type of initiative, the Parliament invites, or receives, people or groups in hearings. There are two main forms for these hearings - “Audições” (where it is a Parliament Commission who takes the initiative and invites individuals/organizations to go to the Parliament) and “Audiências” (where individuals/organizations ask to be heard on the Parliament) to speak- but both are public, and they are considered useful by parliamentarians:

“This is an instrument that we value, public hearings carried out by us, and others that we propose that the commissions hold and promote (...) these are opportunities for those outside the system, or not from those entities that are always called upon (...), it is an opportunity for other entities to sign up and be heard.” (Interviewee 2)

With the aim to reinforce the liaison with academia and inform the Members of Parliament, the Parliament also promoted the initiative from member of Parliament Alexandre Quintanilha to hold “Science Cafe” meetings with scientists and policy-makers.

This initiative started in 2005 and has been taking place annually for the exception of the years 2006 and 2020, and is a joint initiative of the Parliamentary Committee for Education and Science, the Council of Associated Laboratories and *Ciência Viva* (“Live Science”, an association of scientific institutions at national level to promote education and scientific culture) that “aims to promote dialogue and create a network of contacts between participants, thus strengthening the links between political decision and scientific knowledge”². These sessions are organised around a specific topic where experts are invited to talk and parliamentarians can ask questions and debate. The sessions are live-streamed, with support materials and recordings being made available to the public through the *Ciência Viva* website - e.g. the last session’s topic was “What we have learned, but don't yet know, about zoonotic diseases”³.

Two interviewees specifically mentioned this Science Cafe as a very interesting and constructive initiative:

² <https://www.cienciaviva.pt/divulgacao/cafe/home.asp>

³ <https://www.cienciaviva.pt/divulgacao/cafe/2021/doencas-zoonoticas> (in portuguese)

“In the previous legislature, there was a project promoted by Professor Alexandre Quintanilha that was related to meetings with science (...) there was a meeting between Members of Parliament and scientists, people who work in the world of science. They would come and talk about a topic. And the result would be a debate, a conversation from a scientific perspective on the one hand, and a political perspective on the other. I think this idea is brilliant”. (Interviewee 4)

“There is also a specific concept here in Parliament called "Science Café", which was taken up by Member of Parliament Alexandre Quintanilha⁴ in the previous legislature, where a topic is defined and a group of entities from academia or related associations are invited to discuss it. We are willing to listen to entities that have been working in these areas for a long time, in a way that is not connected to political decision-making, so we may be better informed”. (Interviewee 8)

There is also a media monitoring service that is provided by the Government and the Parliament to its members that sometimes includes scientific articles, as referred to by Interviewee 3:

“Clippings we receive within the government, not only from the press but also from relevant articles, already include a lot of information, in the form of scientific articles”. (Interviewee 3)

The interviews then provide evidence for manifold connections between academia and policy-making, e.g., via recruitment from academia, via public hearings with experts, or via promoting science in Science Cafes and dissemination of scientific information along with media clippings. This connection is viewed as desirable and in the opinion of some interviewees could even be improved upon, from sporadic initiatives to an “open channel”:

“Unfortunately, there is no open channel between science and politics. We are talking about the Assembleia da República, which legislates on matters as varied as scientific production itself. (...) It would be desirable to have a much more permanent interconnection, as if it were an open channel allowing a constant relationship between the production of scientific knowledge and the political decision-makers at the Assembly level.” (Interviewee 4)

When asked about their familiarity with Open Science concepts, three of the interviewees stated to be “familiar” with them, two “slightly familiar” and three were not yet familiar with the term prior to the interview. Interviewee 1 revealed themselves to be a supporter of Open Science, in the sense of stating that science shouldn’t be restricted to academia, but instead be available for all that could benefit from it:

“When the concept of Open Science started to be an increasingly wider topic of discussion, I felt a great empathy for this idea: the idea that knowledge should not be only for an elected group (...). And so, from the beginning, I was very sympathetic to the idea of Open Science. I think it makes perfect sense, I think it is the future”. (Interviewee 1)

Another also professed enthusiasm:

“Yes, [the concept is] familiar and [I am] a practitioner, supporter and advocate”. (Interviewee 3)

⁴ The interviewees clearly identified Quintanilha, and since his role is public knowledge via the *Ciência Viva* website, we report this here without anonymisation.

Interviewee 5, however, expressed the opinion that the concept isn't as widespread as it could be:

“I have some reasonable knowledge (...) but I think that here there is clearly a great margin for improvement and progress, to make Open Science even more known”. (Interviewee 5)

When asked, interviewees identified various advantages and benefits of Open Science. The major advantages identified are societal, Interviewee 1 pointed out the democratization of science and knowledge:

“I only see benefits and advantages and I am very pleased that this concept (...) helps to build democracies, because democracies are also based on access to more robust information on various topics.” (Interviewee 1)

Interviewee 2 agrees saying:

“It is important to have the availability [of scientific knowledge], (...) in other words, democratising access to information is an important part, because we cannot have knowledge reserved for an elite”. (Interviewee 2)

Interviewee 5 mentioned the mitigation of inequalities as the main factor:

“[Open Science] also allows us to fight inequalities, because if we have knowledge available, and free, (...) accessible to all, we are also fighting inequalities, because not everyone has the same opportunities to access either physical bibliography or paid online channels; with more knowledge, (...) we can promote development”. (Interviewee 5)

But benefits for the scientists themselves, such as increase in citations and transparency of the research process were also identified, namely by Interviewee 3, a former leading scientist and high-impact researcher:

“We have always been supporters, and we have always used the repository, we have always deposited the information openly, and that has helped a lot with the citations; and therefore, I also believe that the fact that I and other people from the Institute are on the list of most cited scientists also has to do with the way in which we disseminate and make that information available. I think that transparency can only bring advantages; it has had advantages in my professional career, and without a doubt, it has had a great impact, many contacts have arisen, not only from other groups, but also from companies; scientists are much more exposed, because there are also more looks on the data they produce, but at the end of the day, this is also an advantage, because the scrutiny is greater and the interaction is also greater, as long as we start from the assumption that nothing is irrefutable, and that there are no absolute truths”. (Interviewee 3)

For Interviewee 7, another former researcher, in addition to economic benefits from Open Science, accessibility of information is key:

“The impact is big because if there was no Open Science, and if we had to pay for each article (which was paid for with public money) to read it, it would not be possible to have access to all the information we need on a frequent and regular basis”. (Interviewee 7)

Interviewee 8 points out the accessibility and immediate availability of scientific knowledge for free:

“I understand the benefits and advantages, for us, the receivers or beneficiaries, of Open Science, of being able to freely consult (...) the global scientific production, (...) I also understand the advantage, within the system of being able to build upon, what is, a knowledge already created and made public by someone”. (Interviewee 8)

Interviewee 3 declares the openness as an actual practice in the institution and, in general, as a way to promote equality and inclusion:

“We also share all the information, we share all the data, and I think that this should exist in all sectors of activity, of course taking care of all the important issues for the development of business, for intellectual property (...) we should always fight for the democratisation of the access to science, and therefore arrange all the platforms to disseminate it for all”. (Interviewee 3)

Some challenges, risks and disadvantages were also pointed out that had mainly to do with the commercial exploitation of results, the quality of the research made available and the possible appropriation of data. Interviewees 1 and 8 mention that contradiction and Interviewee 7 also mentions the fear that the work can be scooped:

“There are also drawbacks for those who, and for whom, knowledge is economically very valuable. (...) So Open Science is probably inconvenient for those who want to defend intellectual property”. (Interviewee 1)

“The fact that there is some kind of intellectual property, some reserve on the production that a researcher makes, allows him, for some time, to have a competitive advantage, and to be able to continue researching with some gain”. (Interviewee 8)

“Risks could be some appropriation of data at an earlier stage by someone not involved in that research who might use it and take advantage of it”. (Interviewee 7)

Nevertheless, Interviewee 3 clearly dismisses any disadvantage coming from the commercial exploitation of results:

“I have always had patents and have always published [Open Access], it is a question of doing it at the right time; therefore, for me, the fact of publishing in an open way has never hindered patents, protocols with companies, nor projects with companies, nor providing services to companies, on the contrary”. (Interviewee 3)

Interviewees 4 and 8 express also their worry about the quality of research outputs if all were to be Open Access and the need for a “certification” process:

“How am I going to certify that this [knowledge] is being produced as something that is part of that grounded scientific knowledge?” (Interviewee 4)

“If, (...) we always made everything freely available, without any kind of protection, I don't know if, in the long run, we wouldn't have a reduction of quality”. (Interviewee 8)

This shows the persistence of some myths about Open Access literature not being scrutinized⁵, but also the need to teach the non-academic public how to look for Open Access outputs in robust platforms. Interviewee 3 also mentions the danger of misinformation permeating the conversation, especially via social media:

“The risk is for us to be aware that not everything that appears is true, and not only in scientific publications, but in publications in general, and this is now at its peak with the social networks”. (Interviewee 3)

Interviewee 1 suggested that information literacy is a need in order for Open Science to be totally acknowledged and have an impact on citizen's lives. In its absence, they wondered whether the public might be able to fully take advantage of potential I the benefits it could from this openness to publications and data:

“Data is very useful, but knowing how to integrate data into knowledge is a process that is not easy. So there is also another issue, science is not only about opening, it is about opening and helping people to know how to read, interpret and understand what is there (...) you need to be literate enough to understand the richness of Open Science and so this is about education, [and] education takes time, education is expensive”. (Interviewee 1)

Due to information overflow, there's also a need for people to be selective about the information that is meaningful to the individuals, as Interviewee 4 states:

“Many times, the obstacle is precisely that: the immensity of information that exists instead of facilitating our access and the very production of knowledge, ends up being a hindrance because in fact it is difficult, in the midst of this information immensity, to find what we really consider to be more significant”. (Interviewee 4)

Another obstacle to Open Science was also identified by Interviewee 1 to be the inadequate usage of metrics like the impact factor and the h-index to evaluate researchers:

“In the last 40 years, the world of knowledge has become too quantitative, (...) This thing of evaluating people in terms of the H factor and the number of publications and impact factors, to me I confess that it does not impress me very much and I do not pay much attention to these statistics. I am increasingly more impressed by the quality and depth of articles than by the proliferation of articles”. (Interviewee 1)

⁵ <https://www.theguardian.com/higher-education-network/blog/2013/oct/21/open-access-myths-peter-suber-harvard>
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Interviewee 7 mentions his own experience with Open Science practices and the opposition some publishers exert:

“I always tried to use these practices, and I even refused to integrate some articles that were already aimed at certain scientific journals that do not have this kind of practice. Some of them, let's say, belong to the biggest groups of publishers that don't have this kind of practices and that fight for this kind of practices or that Open Science is not a reality”. (Interviewee 7)

Interviewee 8 understands the strain some researchers may be experiencing, between the need to publish in traditional venues with high impact factors - recognized by the research evaluators - and the wish to publish and do research in an open way:

“Here the lines are crossed a bit, between what is the almost utopian desire for publicly financed knowledge that is open to all, and what are the incentives for researchers to progress in their careers, so I think there is something that is not yet completely unblocked here, between these two assets, the legitimate asset of career progression, and the useful asset of open scientific production that is constructive and that in fact reverts to society as a whole”. (Interviewee 8)

When asked about the familiarity with Open Science concepts, Interviewee 8 recalled the Parliamentary initiatives by the former Secretary of State for Science, Technology and Higher Education, Professor Fernanda Rollo:

“The former Secretary of State for Higher Education and Science, Professor Fernanda Rollo, [Open Science] was one of the subjects she often brought up for discussion, and was particularly committed to this, and therefore often appeared in parliament”. (Interviewee 8)

The Government and the Ministry of Science, Technology and Higher Education were committed to promoting Open Science and issued in 2016 the Resolution of the Council of Ministers nr. 21/2016⁶ stating that knowledge produced through public funding (publications and data) should be available in open access, and that the preservation of scientific publications and data to enable re-use and continued access should be ensured. This Resolution also recommended the creation of a working group⁷ with the aim to develop a strategic plan to establish a National Open Science Policy⁸ by 2017, but such a policy never came to light. Nevertheless, Open Science was actively promoted in many venues and the commissioned studies, the reports from the working groups and other training and dissemination materials on Open Science - infographics, an open Science glossary, a MOOC - remain accessible in the website.

In sum, through the interviews it is apparent that in Portugal there is a significant connection between academia and politics, as many of policy-makers have an academic background and maintain academic connections, which facilitates their use of scientific information and also their understanding and support of Open Science.

⁶ <https://dre.pt/pesquisa/-/search/74094659/details/maximized>

⁷ <https://www.ciencia-aberta.pt/working-group>

⁸ <https://www.ciencia-aberta.pt/nosp>

4. Analysis and Discussion

4.1. Survey

As already stated, the low survey response rate makes it very difficult to draw generalized conclusions. However, it certainly provides useful indicative evidence, especially which taken together with background literature on the topic.

Firstly, survey respondents reported using scientific information regularly to directly support their political and legislative work. However, scientific literature (primary and secondary) does not play a prominent role. Rather, policy briefs were found to be the most effective form of communication, followed by oral forms of communication. Overall, this conforms to our findings from the literature reported in ON-MERRIT Deliverable 5.1 (Reichmann, Wieser, and Ross-Hellauer 2020).

Credibility is key here. Reputation and perceived-legitimacy of the information source (whether institutional affiliation of people or journal prestige of peer-reviewed publications) seems to be the most important criteria for the selection and use of scientific information by political representatives, outweighing convenience in the form of easy discoverability and free access, although these were also valued. International organisations also turn out to be a very important source of information, followed by governmental websites.

Deliberative processes (consultation with experts, stakeholders or society in general, through various means) are prominently employed to inform the policy-making process. The data suggest that if located at or hosted by the parliament, this is favourable for uptake.

Our results show a great deal of support amongst respondents for the concept of Open Science in general, despite the fact that the vast majority of respondents are not involved in policy-making regarding Open Science. Although more agreed with the position that “The overall current system of scholarly communications works well” than disagreed, there was nonetheless significant support for Open Science practices such as Open Access and Open Data, as well as for policy requirements to further foster these activities.

However, this valuing of Open Science in the abstract was accompanied by a limited knowledge and understanding of its scope, components and concepts amongst respondents. This general enthusiasm but lack of in-depth knowledge is worth noticing considering the increased importance and visibility of the Open Science agenda in the European context, both at EU level (since 2012, several policy documents⁹ from members of the Commission, stronger and wider Open Access and Open Data requirements on research funding in Horizon 2020 and announced Open Science as default for Horizon Europe) and in several countries

⁹ European Commission Recommendation on access to and preservation of scientific information - <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32012H0417&rid=1>;
Open innovation, open science, open to the world - a vision for Europe - <https://op.europa.eu/pt/publication-detail/-/publication/3213b335-1cbc-11e6-ba9a-01aa75ed71a1>;
COUNCIL CONCLUSIONS ON THE TRANSITION TOWARDS AN OPEN SCIENCE SYSTEM - <https://data.consilium.europa.eu/doc/document/ST-9526-2016-INIT/en/pdf>;
Commission Recommendation (EU) 2018/790 of 25 April 2018 on access to and preservation of scientific information <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32018H0790>
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(like France or Netherlands to name just a few). This perhaps reflects the “motherhood and apple pie” nature of Open Science as something perceived as good and important in the abstract, but shows that there is still work to do in making the benefits of these concepts shine through to extra-university actors like policy-makers.

Somewhat surprising is that Citizen Science showed low levels of familiarity and was perceived as least relevant for policy-making.

Regarding our broader question of the extent to which Open Science can impact uptake of scientific information in policy-making, our results hence do not seem to confirm completely what is usually reported. The potential for Open Access to research publications to benefit public policy has been noted in the literature. ElSabry's (2017) study of funder OA policies found that a sixth explicitly mentioned that OA would benefit public sector policy researchers. Already in 2003, Willinsky noted that paywalls were often mentioned as a difficulty for policy researchers, who largely restricted themselves to OA sources (Willinsky 2003). Willinsky hence foresaw OA as a potential “counterforce to policymakers' reliance on a small number of academic consultants as gatekeepers and sources for research.” An influential review of the “academic, economic and societal impacts of Open Access” (Tennant et al. 2016) claimed that “if an article has fewer restrictions for journalists, citizens, businesses, and policy-makers, it seems logical that this would enable the research to be publicly re-used. Furthermore, those parties may be more likely to promote articles which are publicly accessible into different communication channels.” The authors concluded that “increased access to scholarly outputs might help foster a culture of greater scientific education and literacy, which in turn could have a direct impact on public policy” (Tennant et al. 2016).

Our findings indicate, however, that although easy availability of information is important, policy-makers rely more on secondary sources and policy briefs. Hence Open Access to the primary scientific literature is unlikely to have a huge impact on the uptake of scientific resources amongst policy-makers. Rather it reinforces the importance of filtering and translating this work into forms findable by and understandable to policy-makers. In line with the themes of ON-MERRIT, and as will be explored in greater depth in the upcoming ON-MERRIT Deliverable 5.3, these facts privilege those with the resources available to invest in this translational work in a way Open Science does not mitigate.

4.2. Interviews

For the interviews, we were able to gather a small but diverse group of eight policy-makers, covering our three main disciplinary areas of concern within ON-MERRIT: Agriculture, Environment and Health. Unfortunately, we were unable to recruit among members of two political parties so they are not represented in the sample. This group had a high education level - four of the interviewees hold a Doctorate (PhD), one holds a Master's degree and the other three a Bachelor degree in diverse areas - and shows a strong connection to academia, as three interviewees were former scientists and researchers, one is still a teacher in a higher education institution, and another two were recruited for the parliament after finishing their degree. In some of their answers, interviewees responded as researchers in spite of their current role as politicians, as for example, in sharing their views on research assessment.

To summarize briefly, the interviews clearly show that the case of Portugal is special in many ways, even while some of our findings mainly corroborate existing literature on information-seeking by policy-makers. In particular, preliminary research (Reichmann, Wieser, and Ross-Hellauer 2020) has shown that the

literature on information-seeking by policy-makers builds on the assumption that researchers need to do a better job at understanding how policy processes work in order to influence policy (Macintyre 2012). Within the literature, three kinds of key actors are identified (Kim et al. 2018): Knowledge users (e.g., policy-makers), intermediaries, and knowledge producers, in addition to three basic components of knowledge exchange systems: 1) the roles of individual actors (producers, intermediaries, users), 2) the nature of the knowledge exchanged, and 3) the process of knowledge use (Contandriopoulos et al. 2010). Importantly for our purposes, the respective literature is predominantly from the Anglo-Saxon political context (UK, Australia, and, to a lesser extent, the US as well as certain parts of Africa) and relies almost exclusively on qualitative methods, i.e., surveys and interviews with research users (politicians, civil servants, etc.) and research producers. These methods do have their merits, however, in that observing processes of information-seeking or research use would be a prohibitively complex undertaking. Further, the majority of international, peer-reviewed case studies stem from an anglophone context and are therefore indebted to the specificities of those political systems; we were able to sample from a specific (if lesser known) national context to add to the international research landscape. The following discussion therefore contextualizes our findings within the broader research landscape, highlighting similarities and differences and suggesting avenues for further research.

As has been found in the literature review associated with this task (Reichmann, Wieser, and Ross-Hellauer 2020, 22), “[r]esearchers’ ingrained traditions of communication (via peer-reviewed publications) are ill-attuned to the needs of policy-makers in terms of seeking researchers’ advice”, i.e., policy-makers are often ill-equipped to meaningfully engage with scientific literature. In the Portuguese context, however, this does not seem to hold, since our interviewees all held academic degrees, with many in fact coming from research (or still holding onto research-related roles while in office). Therefore, in Portugal at least it does seem to be the case that “potential experts are often identified based on policy-makers’ engagement with literature (this pertains mostly to policy-makers in research-related roles), through conferences, personal networks and past committee memberships, and sometimes through self-identification of researchers (though this seems to be somewhat less prominent)” (Reichmann, Wieser, and Ross-Hellauer 2020, 22). These findings fit in with the common idea identified by Lopes et al. (2017, 58) among the Portuguese policy makers that their political roles are transitory and not a “real” career: “Members of all parliamentary groups, without exception, said that in their parties the office of parliamentarian is not associated with a profession as such, and even less is political activity associated with a career that one builds”. For the case of Portugal, then, the fourfold typology of policy-interested academics developed by Head (2015) needs to be amended by a fifth type, academics who move between academia and policy roles.

As has been found in some studies of policy-makers’ information-seeking behaviours, the Internet is frequently their go-to source to seek information (e.g., Dodson, Geary, and Brownson 2015). This is certainly the case in Portugal according to our informants. As concerns the role of scientific information, the findings from our sample corroborate, but not really add to, received knowledge. As has been noted, the goal of research in government is to find information that will help solve specific, predefined policy problems (Glied, Wittenberg, and Israeli 2018). We learned from our informants that scientific information is considered key for developing policies, but is then always contextualized with party lines to develop political positions on given policy issues. While the literature reviewed for our scoping report largely finds a scarcity of formal procedures to identify experts (“pools” of potential consulting experts are stagnant), our interviewees identified a number of procedures of expert consultation institutionalized within the Portuguese political system involving, but not limited to, academic institutions.

As concerns the role perception of policy-makers, Portugal seems to be unique which again relates back to the fact that the policy world is not considered a career, which means that those who go into policy have an interest in maintaining close ties with their former role. Since many policy-makers are indeed former academics, this suggests that in Portugal at least, connections between policy and academia are stronger than elsewhere. This is highly relevant in the sense that the quality of relationships between researchers, policy-makers and (sometimes) intermediaries is a well-recognized research area. For example, Oliver et al. (2014) found that collaboration between researchers and policy-makers, along with improved relationships and skills were the most frequently reported facilitators of research uptake, even while long-term collaboration may be hampered by the short-term nature of research work (Elliott and Popay 2000). Our findings suggest that in the case of Portugal, relationship quality and maintenance does not seem to be a salient issue since many policy-makers anyway have one foot in academia. Whether this can be considered a kind of upstream collaboration, i.e., collaboration that starts already at the stage of knowledge production, which has been described as a desideratum of researchers and policy-makers alike (Choi et al. 2016), is an open question.

One of the most salient issues examined in the literature review associated with this task concerns the fact that topical scientific expertise is not used in policy-making despite its availability (Haines, Kuruvilla, and Borchert 2004), an issue that has been dubbed the “evidence-policy gap”. Discussions of the evidence-policy gap abound in the health policy literature (Brownson and Jones 2009; Cairney, Oliver, and Wellstead 2016; Choi et al. 2016; Dodson, Geary, and Brownson 2015; Ellen et al. 2018; Gollust et al. 2017; Haynes et al. 2011; Oliver et al. 2017). There especially, the relationship between policy-makers and researchers is frequently described as one of mutual misunderstanding or even outright mistrust (Haynes et al. 2012). Reasons presented are manifold and range from fundamentally different goals and values to differences in communication style (Merlo et al. 2015). This does not seem to be the case in Portugal, however, based on what our informants told us. Even while their own communication behaviours and information-seeking strategies are very similar to those described in the literature for other regions, they do not seem to experience the same barriers to research uptake, and the primary reason for this seem to be their close ties they seek to maintain with academia, but also with other important stakeholder groups. For instance, MPs are expected to maintain close ties with their regional electorate (which they act on behalf of in parliament), as well as seeking out the opinions and viewpoints of other relevant stakeholders, including industry and civil society actors. In addition, innovative fora for exchange may play a role. Two of our respondents reported enthusiastically on the success of the “Science Cafe” concept in Portugal. Although originally foreseen as a mechanism to foster public participation in science (Nielsen et al. 2015; Pacini and Bagnoli 2019), our respondents reported that these informal meetings also directly enabled dialogue between scientists and policy-makers.

Our interviewees were clearly aware that policy-making is never about neutral information, but rather always and inherently about interests of stakeholders, to be understood, weighed, and taken into account. This is also clearly established in the literature, which maintains that the policy process is inherently political, and necessarily dependent on policy-makers’ (and other stakeholders’) preferences as well as their adherence to goals and values (Head 2016; Kothari et al. 2011). These “deliberative” aspects of the policy process cannot be accounted for in “linear” (problem-centred) models of knowledge transfer because neutral scientific evidence by itself cannot drive policy processes (Elliott and Popay 2000). In fact, some have claimed that the political process is marked by conflict where evidence is used to make arguments about ends and means

(Head 2016). Whereas researchers tend to work with clearly defined problems, policy-makers need to address an entire problem in all its complexity (Kothari et al. 2011). Therefore, policy-makers are motivated by factors other than research evidence (Head 2016). Our interviewees clearly understood these aspects of their role and stressed the importance of weighing interests and goals with any evidence taken into account. While some commentators on the evidence-policy gap have concluded that these discrepancies make collaboration between researchers and policy-makers prone to conflict (e.g. Choi et al. 2005), our findings suggest that where policy-makers come from academia or still work in academia, the issue of collaboration is not as salient, in part because “collaboration tends to run more smoothly when research goals match the beliefs, goals, values and policy aims of policy-makers, an observation that directly contradicts demands of neutrality” (Reichmann, Wieser, and Ross-Hellauer 2020, 26).

To add to that, the suggested discrepancies in norms and values are consequential for how the potential for research uptake is perceived. For instance, Martin et al. (2011) found that researchers and policy-makers offered contradictory accounts of research knowledge (as a product or outcome or as a mindset for solving problems, respectively); Ellen et al. (2011) found that policy-makers tended towards the view that research uptake faces practical constraints, while researchers believed that utilization was hindered by lack of coordination between knowledge users and producers. Policy-makers in our interview sample were very positive about research uptake. Since most of our interviewees had a research background, this suggests that they would be used to wearing both hats and therefore judging the potential for research uptake more favourably.

Finally, the literature holds an important caveat in saying that evidence never directly solves policy problems, but needs to be embedded first in action proposals according to predefined policy goals (Contandriopoulos et al. 2010, 459). Therefore, the mere internal validity of information is not enough to influence the use of information (ibid. 457), a finding that is corroborated by our interviewees who agreed that scientific evidence always needs to be contextualized within policy goals and party lines.

Overall, our findings suggest that when it comes to research-policy-connections in Portugal at least, the picture of two cultures where research uptake is modelled as a linear process is untenable. This picture rests on the assumption, corroborated by a large proportion of the reviewed literature, that researchers and policy-makers reside in two different worlds (e.g., in Gollust et al. 2017). According to their study, the two groups differ fundamentally, even in how they interpret the concept of research (though both groups consider the instrumental value of research in the policy-making process). They point out, however, that both researchers and policy-makers face essentially the same barriers to research translation. Mutual distrust is then a recurring issue – policy-makers questioned the credibility of research(ers), and researchers questioned policy-makers’ authentic desire to use evidence in decision making (i.e., researchers feared their expertise was being used merely to provide legitimacy, not to develop policies in the first place). The findings presented here suggest that there might be something wrong with this picture that assumes two clearly separated groups (researchers and policymakers), each with their own processes of enculturation which then explains difficulties in communication. The case of Portugal suggests that the situation is not so uniform and that in fact, some of these findings need to be corrected for the professional backgrounds of policy-makers.

We also note that the interviewees in our sample regarded Open Science as beneficial to science and society at large, even while expressing reservations regarding data literacy as well as issues of IPR as being potential pitfalls of the Open Science transition. This finding is well in line with more recent work on the pitfalls associated with implementing certain practices associated with Open Science, which seem to run the risk of

coming up against a digital divide. For instance, Open Data threaten to marginalize those that cannot engage with data effectively (Atenas, Havemann, and Timmermann 2020; Yoon and Copeland 2019) due to the “unequal distribution of data literacy” regarding technical competences for dealing with data (D’Ignazio and Bhargava 2018). There is then an important distinction between providing access to and fostering the ability to use data (L. M. Bezuidenhout et al. 2017). White males and well-educated students are the primary users of Open Educational Resources (Raffaghelli 2020), which suggests that middle-class knowledge workers benefit disproportionately from open resources due to their ability to mine, analyse, aggregate, and share data (Raffaghelli 2020). The wide-spread view of open data as inherently democratic is therefore problematic (Jeffrey Alan Johnson 2014; J.A. Johnson 2018). In a similar vein, Bezuidenhout and colleagues (2017) studied conditions for research in low-resourced environments where researchers opt for closure over openness because their day-to-day challenges of conducting research push them towards strategically limiting access to their data (Rappert and Bezuidenhout 2016). National inequalities in data infrastructures persist (Cinnamon 2020), creating different binds and dilemmas in different contexts. Consequently, open data logics have little traction with researchers working in these environments (Rappert and Bezuidenhout 2016).

Finally, we may reflect further on the scientific expertise derived from professional experience possessed by many of our interviewees. In his ethnographic study of the Parliament, *Social classes, life course and power: An ethnographic approach of the political representation*, João Mineiro differentiates two types of parliamentarians:

“In the Assembly we find people whose biographical trajectory is shaped by their party trajectories, but others who had a professional path independent of political life. Parliamentarians who arrived at the institution after leaving university, and others who have been circulating in those corridors for more than three decades. Representatives with high levels of education, from liberal professions and economically favoured situations, and others from less qualified professions and from different geographical backgrounds.” (Mineiro 2019)

This specific group of “technical parliamentarians” are people recruited due to their high qualification and professional background that can easily integrate the parties and influence opinions. Four of our interviewees fit into this category of “technical parliamentarians”. The interviews reveal how this shapes interviewees’ approach to information-seeking as well as attitudes towards Open Science. Their familiarity with the research process allows those policy-makers with an academic background to search for relevant information by themselves, so they depend less on information received from other sources to build their own positions. Contrary to the results from the survey, in the interviews primary and secondary scientific literature was one of the most used information types, at the same level as reports and policy briefs.

We understand that these intimate connections between academia and policy might be somewhat idiosyncratic, but they do provide an important corrective to received analyses of research uptake. Yet it is clear that amongst our cohort at least, the idea of an “Evidence-Policy Gap” (Reichmann et al. 2020: D5.1, p. 33) where there is a disconnect between researchers and policy-makers, is much less tenable. Rather, we witness an integration of academics in political positions. It is interesting to reflect on the extent to which this may reflect the increased participation of scholars in Portuguese political processes, or whether this is an artefact of sample bias in our interviews. We leave this question open for future work.

5. Conclusions

Work Package 5 of ON-MERRIT aims at revealing the role of Open Access and Open Science resources, as well as public engagement, in policy-making. This current study (conducted as Task 2 of that Work Package) has sought to reveal the extent to which Open Science outputs are used in policy-making and how this relates to broader issues of access and engagement in political processes. This was achieved via a small-scale online survey of European policy-makers, and a country case-study of the situation in Portugal via in-depth interviews with national policy-makers.

We see strong support for the aims of Open Science and its principles of democratization of knowledge, mitigation of inequalities and societal impact in both our survey and interviews. However, this is not reflected by a deep knowledge of the aims and aspects of Open Science, except perhaps amongst our interview respondents with deep links to academia. Hence, we might question the extent to which Open Science is valued amongst policy-makers more for its virtues in the abstract rather than its specific potential to foster uptake of scientific findings in policy-making.

Indeed, we see limited potential for many elements of Open Science to directly impact research uptake. Our survey confirmed the literature in showing the importance of policy briefs and personal connections in policy-makers' information-seeking behaviours, and the relatively secondary importance of direct engagement with the scientific literature. This level of knowledge and engagement in Open Science practices and policies we've encountered is overall lower than what could be expected from the prominence that the Open Science agenda has had in the last decade in the context of European research policies. Hence Open Access to the primary scientific literature or to Open Data is unlikely to have a significant impact on the general uptake of scientific resources amongst policy-makers. Rather it reinforces the importance of filtering and translating this work into forms findable by and understandable to policy-makers. A lack of familiarity with other elements like Citizen Science confirms there is much work to do to enable Open Science to impact policy-making.

Our study also challenges the general notion of the "evidence-policy gap", especially amongst our interview cohort of policy-makers who also identify as academics. The idea of academics and policy-makers inhabiting different "worlds" is particularly untenable in such cases. In fact, the case of Portugal shows that in a political context where policymakers are frequently recruited from within academia, with the added condition of temporality (after all, policy is not considered a vocation in Portugal), the distinction of two groups (academics and policymakers), and the subsequent conclusion of a gap or gulf between those groups, is markedly less plausible. In view of the international research landscape on issues of knowledge transfer, research uptake, and relationships between academia and policy, then, Portugal provides an excellent case study, in exemplifying a system where research uptake is such that researchers effectively are recruited into policy positions. The interviews clearly show that respondents' intimate familiarity with both worlds frequently renders the issue of uptake obsolete, as policymakers with academic credentials do not have a problem reading or understanding academic literature.

Nonetheless, our results show evidence of significant differences and variations regarding access to and use of scientific information, evidence and expertise, even though all interviewees acknowledged the fundamental importance of expertise in policy development. Indeed, our interviewees were acutely aware that policymaking constitutes a deliberative (i.e., interest-driven, political, involving different stakeholders) process and considered the idea of knowledge transfer as a linear process untenable. An often-raised issue

in the literature concerns differing goals and values. There, interviewees were acutely aware that research and policymaking follow different (and often conflicting) logics, and were also perceptive about the role, function, and limits of expertise in government. There certainly remain opportunities for improvement in this respect. Even in the Portuguese context, as one of the interviewees stated, there is a need for more structured and continuous flows of scientific information for policy-makers, in order to secure better informed decision-making processes. The Portuguese case, then, seems to represent a novel kind of policy-active academic, namely the one who moves between academia and policy- (or decision-) making roles (and sometimes back). This is especially pertinent given the cultural preconceptions about policy as a vocation described by the interviewees. Their special status as “technical parliamentarians” has profound implications for their information-seeking habits and understanding of Open Science.

5.1. Limitations and future work

When doing our study, we came across some general limitations, the most relevant one being the pandemic crisis we are experiencing at a global level, that had repercussions in many fields and in the availability of people to participate in the survey and interviews, especially within one of our areas of study, Health. We can point out some other specific limitations of our survey and interviews:

- **Survey:** Our sample was small and hence the results should generally be taken as indicative rather than generalisable. In addition, especially given the difficulties in obtaining respondents, we should keep in mind that there may be a sampling bias towards those representatives who use more scientific information in general.
- **Interviews:** Eight interviews, the number conducted in line with project resources, is not a sufficient number to allow us to draw strong conclusions regarding the situation in Portugal. In addition, although we have tried to make clear the extent to which Portugal is and is not representative of other democracies in Europe, care should be taken in generalising these findings to other countries. Finally, there may be some sampling bias, as with the survey, which meant that those most keen to participate in our study were those most interested in the academic system and in scientific information generally. This may especially influence our results regarding direct use of scientific resources, which our interviews revealed to be higher than would be expected from the literature review and survey findings.

Regarding future work, we can say that our findings generally reflect what is known from the literature: that accessibility of information and reliance on personal networks are key factors in uptake of research findings in policy-making. However, reflecting specifically on the place of Open Science, it is clear that policy-makers value this in the abstract but (except in the case of the “technical parliamentarians” amongst our interviewees) generally see it as less of direct relevance to them, since they do not usually expect to engage directly with scientific publications or data. For future work, therefore, we would suggest the role of “technical parliamentarians” and their potential engagement with Open Science outputs be more fully studied, especially to further examine whether their prevalence in our interview sample was fully representative of the Portuguese reality, and how it compares with the scientific education- and experience-levels of policy-makers from other countries.

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7. Annexes

7.1. Annex A: Survey instrument

ON-MERRIT Survey on the uptake of Open Science in information seeking practices in policy making
Survey on the uptake of Freely Available Scientific Resources in policy making.

ON-MERRIT - Observing and Negating Matthew Effects in Responsible Research & Innovation Transformation - aims to contribute to an equitable scientific system that rewards researchers based on merit. Given that Open Science (OS) emphasizes equity as an outcome, we investigate the impact of OS practices in academia, industry, and policy to see if this is the case in practice. In particular, we focus on institutions and individuals working in the areas of agriculture, climate and health (key pillars of the UN Sustainable Development Goals) and are interested in gender as a potentially cross-cutting issue.

As part of the ON-MERRIT project, we are conducting a survey across Europe to develop deeper insights into the current status of the uptake of Open Science in policy making.

With this questionnaire we are investigating if policy-makers take up freely available scientific resources (Open Science resources) such as publications and to what extent these resources are integrated into their decision-making processes. Additionally, we hope to identify any barriers and challenges that might prevent this from happening.

We invite Members of Parliaments, Governments and Policy workers from all countries across Europe in the domains of health, climate or agriculture, to participate in this survey. We would be grateful for your help in circulating this survey within your networks.

To learn more about ON-MERRIT, visit our website: <https://on-merrit.eu/> .

This project is funded by European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement number 824612.

Completing this questionnaire will take approximately 15 minutes.

Consent Form

[YES/NO]

- I confirm that I have read the participant information.
- I understand that my participation in this study is voluntary and that I am free to withdraw at any time.
- I understand that it will not be possible to remove my data from the project once it has been anonymised and becomes part of the data set. I agree to take part on this basis.
- I agree that any data collected may be published in an anonymous form in books, reports or journals and shared in presentations.
- I agree to take part in this study.

Part I - Demographics

In this section we would like to learn more about you and your background.

A1 - In which country is your organization based: (please choose)

- Austria
- Belgium
- Bulgaria
- Croatia
- Cyprus
- Czech Republic
- Denmark
- Estonia
- Finland
- France
- Germany
- Greece
- Hungary
- Ireland
- Italy
- Latvia
- Lithuania
- Luxembourg
- Malta
- Netherlands
- Poland
- Portugal
- Romania
- Slovakia
- Slovenia
- Spain
- Sweden
- United Kingdom

A2 - Please select the gender category that best describes you

- Female
- Male
- Other
- Prefer not to say

A3 - What is your age?

- <20
- 20-29;
- 30-39;
- 40-49;
- 50-59;

- 60-69;
- 70+

A4 - What is the highest education level you completed?

- Upper secondary education
- Post-secondary non-tertiary education (e.g. VET Schools, schools of healthcare and nursing)
- Short-cycle tertiary education (e.g. master schools, colleges, vocational training schools)
- Bachelor or equivalent
- Master or equivalent
- Doctorate or equivalent
- Other [FreeText]

A5 - What is your mother tongue? Please choose the one that applies

Albanian, Armenian, Azeri, Basque, Belarusian, Bosnian, Breton, Bulgarian, Castilian Spanish, Catalan, Croatian, Czech, Danish, Dutch, English, Estonian, Faroese, Finnish, French, Galician, Georgian, German, Greek, Hungarian, Icelandic, Irish, Italian, Latvian, Luxembourgish, Lithuanian, Macedonian, Maltese, Montenegrin, Norwegian, Polish, Portuguese, Romani, Romanian, Russian, Sámi, Scots Gaelic, Serbian, Slovak, Slovenian, Swedish, Turkish, Ukrainian, Welsh, Yiddish.

Other - which?

A6 - Are you comfortable reading in the following languages? Please choose all that apply

Albanian, Armenian, Azeri, Basque, Belarusian, Bosnian, Breton, Bulgarian, Castilian Spanish, Catalan, Croatian, Czech, Danish, Dutch, English, Estonian, Faroese, Finnish, French, Galician, Georgian, German, Greek, Hungarian, Icelandic, Irish, Italian, Latvian, Luxembourgish, Lithuanian, Macedonian, Maltese, Montenegrin, Norwegian, Polish, Portuguese, Romani, Romanian, Russian, Sámi, Scots Gaelic, Serbian, Slovak, Slovenian, Swedish, Turkish, Ukrainian, Welsh, Yiddish.

Other - which?

A7 - What is your position?

- Member of Parliament (MP, deputy or senator)
- Member of government (minister or secretary of state)
- Policy worker/supporting staff for parliament
- Policy worker/supporting staff for a ministry
- Policy worker/supporting staff for a political party
- Other

A8 To which political group do you belong, or do you consider yourself to be the closest (choose the one that best represents your political affiliation from the list of political groups of the European Parliament)?

- European Conservatives and Reformists
- European People's Party
- European United Left - Nordic Green Left
- Greens/ European Free Alliance
- Identity and Democracy
- Renew Europe

- Non-inscrits
- Progressive Alliance of Socialists and Democrats
- Prefer not to say

A.9 - In which area of policy are you most active or work on the most?

- Agriculture, forestry and fisheries
- Climate
- Economy and Finance
- Education
- Energy
- Environment
- Employment and Work
- Health
- Industry
- International Relations
- Law
- Representation of minority groups
- Research, Science and Innovation
- Social Protection
- Transport
- Urban and regional planning
- Other? Please Specify_____

Part II - Information Seeking Strategies

B1 - How often do you use scientific information to support your decision making, political/ legislative work?

- Never
- Rarely (once or twice per year)
- Sometimes (once or twice per month)
- Often (weekly)
- Always (almost daily)

B2 - How often do you use the following kinds of (scientific) information in your line of work? [scale] never, rarely, sometimes, often, always

1. Primary scientific literature (e.g., journal articles, research monographs)
2. Secondary scientific literature such as systematic reviews and literature reviews
3. White papers/Policy documents from international organizations (e.g., EU, OECD, WHO)
4. White papers/Policy documents from national governmental/ state organisations
5. Policy briefs/civil society reports
6. Internally commissioned studies
7. Business reports
8. Oral information from experts

B3 - Where do you look for information? Please rate the sources of information according to how often you use them for your parliamentary or ministerial work: [scale] never, rarely, sometimes, often, always

1. Web search engines (e.g, Google, Bing)
2. Research literature databases (e.g., Web of Science, Scopus, Google Scholar)
3. Libraries (National, Universities, parliamentary, ...)
4. Websites of international organisations (e.g. WHO, OECD, IPCC, UNO, ...)
5. Websites of Advisory boards (officially nominated by the government or parliament), e.g. Technology Assessment offices at the parliament (or similar), ...
6. Websites of Government/ministeries of other countries
7. Websites of Civil society organizations (websites and publications)
8. Websites of Corporate or industry associations/organization websites
9. Formal consultation exercises with experts (e.g., independent experts, advisory boards) advice
10. Informal consultation with experts
11. Formal consultation exercises with stakeholders
12. Informal consultation with stakeholders
13. Other - please specify---

B4 - How important are the following factors in helping you assess the quality of scientific information? [not at all important, somewhat important, very important]

1. Personal contacts
2. Previous experiences
3. Reputation of person or institution
4. Availability/accessibility
5. Relevance and usability (length of document, jargon, ...)
6. Timeliness
7. Recommendation from a trusted colleague
8. Featured in the news

B5 - From your experience, would you be more likely to use scientific information to support your political decisions if: [scale] strongly disagree; disagree; neither agree nor disagree; agree; strongly agree)

1. This information is available for free
2. This information is from reliable research organizations
3. This information is from reputed peer reviewed journals
4. This information is easily found on the internet

Part III - Attitudes to Open Science

Open Science aims to remove barriers to accessibility and the re-use of scientific outputs. It is designed to make the scientific process and the knowledge it yields more reproducible, accessible, shared and collaborative. It includes practices like Open Access to publications, Open Data, fully transparent methods, and Citizen Science.

Within this section of the questionnaire, we are interested in your attitude towards Open Science.

C1 - Prior to starting this questionnaire, how familiar would you say you were with the following concepts of Open Science? [scale] Not at all familiar/ slightly familiar/ moderately familiar/ very familiar/ extremely familiar

1. Open Science
2. Open Access
3. Open Data
4. Reproducible Research
5. Open Peer Review
6. Open Source Software
7. Open licenses
8. Ethics in research/ Research integrity
9. Citizen science

C2 - Please indicate the extent to which you agree with the following statements. [scale] strongly disagree, disagree, neither agree nor disagree, agree, strongly agree, don't know

1. The overall current system of scholarly communications works well
2. Making research publications Open Access should be a common policy requirement
3. Making research data openly available should be common policy requirement
4. Open Access and Open Science make it easier for me to find scientific information
5. Researchers and research organizations should actively promote public engagement in all steps of research processes

C3 - Are you involved in Open Science policy making (select all that apply)

1. Yes, at a national level
2. Yes, at a regional level
3. Yes, in a personal capacity
4. Yes, in another context/capacity. Please describe _____
5. No

C4 - How frequently does your organisation (ministry, parliamentary group, ...) employ the following practices to inform the policy-making process? [scale] never, rarely, sometimes, often, always

1. Commission of public engagement exercises
2. Run or host Citizen Science initiatives
3. Request for Open Access to publications and data resulting from projects commissioned by your department, ministry or body
4. Establish (new) and engage (existing) advisory boards (such as: office of technology assessment, ethics council and committees, or similar organizations) to advise policy processes.
5. Initiate or host open deliberation processes at parliament (e.g. enquete commission, public consultations, public hearings, conferences)
6. Other (please specify):

7.2. Annex B: Interview Guidelines

For parliamentarians and ministers

RQ1: How Open Science outputs are used in policy-making

Sub research questions are:

RQ2: Which societal actors have influence in public participation in policy-making

Duration: 20-30 minutes

Introduction

On-MERRIT (<https://on-merrit.eu>) is an EU project that investigates the impact, influence and uptake of Open Science in academia, industry, and policy in the domains of climate, health and agriculture. Open Science means the practice of science in such a way that others can collaborate and contribute, where research data, lab notes and other research processes are freely available, under terms that enable reuse, redistribution and reproduction of the research and its underlying data and methods. Open access to [research] literature means its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself." [Budapest Open Access Initiative]

Open (research) data consists of 'any information that has been collected, observed, generated or created to validate original research findings'.

With this interview study we would like to find out How Open Science outputs are used in policy-making. Furthermore, we also would like to investigate which challenges and barriers exist that may prevent its use.

The results of this interview will be on the one hand made available to partners of the ON-MERRIT project and we also plan a publication. However, before we process the gained insights, we ensure that all data and information that you share with us, will be anonymized, so that no one will ever be able to draw conclusions to refer back to you or your company.

Consent for recording: All information you will give me during the interview will safely be stored (encrypted) and the results/answer given will only be used in an anonymous way (for a publication) and will not be given to any third person.

So, is it ok if I record this interview for later analysis w.r.t. research conducted?

Working Context

At the beginning of the interview, I am interested to learn more about you and your background: which country you represent, your mother tongue, in which area of policy are you most active, your political affiliation (if applicable), and other languages spoken/ understood as this may reflect on your information-seeking behaviour which is the second topic we would like to know about.

Information Seeking Strategies

And second, I would like to know what are your practices in looking for information to back your political decisions: what kind of documents do you use, where do you look for them and the factors that may influence your decisions.

Q1 - Where do you look for information?

1. Web search engines (e.g, Google, Bing)
2. Research literature databases (e.g., Web of Science, Scopus, Google Scholar)
3. Libraries (National, Universities, parliamentarian, ...)
4. Websites of international organisations (e.g. WHO, OECD, IPCC, UNO, ...)
5. Websites of Advisory boards (officially nominated by the government or parliament), e.g. Technology Assessment offices at the parliament (or similar), ...
6. Websites of Governmental/ministerial websites of other countries
7. Websites of Civil society organizations (websites and publications)
8. Websites of Corporate or industry associations/organization websites
9. Formal consultation exercises with experts (e.g., independent experts, advisory boards) advice
10. Informal consultation with experts
11. Formal consultation exercises with stakeholders
12. Informal consultation with stakeholders
13. Other - please specify---

Q2 - How important are the following factors in helping you assess the quality of scientific information?

1. Personal contacts
2. Previous experiences
3. Reputation of person or institution
4. Availability/accessibility
5. Relevance and usability (length of document, jargon, ...)
6. Timeliness
7. Recommendation from a trusted colleague
8. Featured in the news

Q3 - How frequently does your organisation (ministry, parliamentarian group, ...) employ the following practices to inform the policy-making process?

1. Commission of public engagement exercises
2. Run or host citizen science initiatives
3. Request for Open Access to publications and data resulting from projects commissioned by your department, ministry or body
4. Establish (new) and engage (existing) advisory boards (such as: office of technology assessment, ethics council and committees, or similar organizations) to advise policy processes.
5. Initiate or host open deliberation processes at parliament (e.g. enquete commission, public consultations, public hearings, conferences)
6. Other (please specify):

Attitudes to Open Science

Third, we would like to perceive your understanding and attitude towards Open Science.

Q1 - How familiar are you with Open Science concepts?

Q2 - What is your opinion on Open Science?

- Benefits
- Risks

Q3 - Are you involved in Open Science policy making?

1. Yes, at a national level
2. Yes, at a regional level
3. Yes, in a personal capacity
4. Yes, in another context/capacity. Please describe_____
5. No

End of the interview

- Is there anything you would like to add to the interview?
- Do you have any final comments for us?

Thank you for participating!