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# Towards a system of open access to publications

Master Thesis Innovation Sciences

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# ABSTRACT

Driven by a digitization of society, the academic publishing industry has undergone major changes in the past two decades, with online articles replacing paper-printed articles as the main example. Furthermore, in November 2013 the Dutch government formulated the aim to reach a system of full open access to publications (OAP) by 2024 and in May 2016 the Competitiveness Council of the EU took important decisions to achieve immediate OAP by 2020. Clearly, a transition towards OAP has been initiated, reflected by the establishment of a remarkable number of open access (OA)-journals.

Nevertheless, publishers of OA-journals face major challenges. To overcome these challenges and establish a successful introduction to the market, the innovation of OAP has to fulfil customer's needs and be superior to alternatives. Therefore, an understanding of potential customers and the factors influencing their decision to adopt the innovation, is important. This research focuses on the scientist as the customer of OAP, because a scientist decides where to submit his/her paper and therefore whether or not to publish in OA. Previous research has explored the challenges posed to OAP by examining the awareness of, experience with and attitude among scientists towards OAP and has aimed to uncover factors influencing a scientist's decision whether or not to adopt OAP. However, the factors identified remain limited. This research identified the factors scientists employed by Dutch universities perceive as incentive or barrier in their adoption-decision process for OAP. In doing so, this research complemented the range of factors influencing a scientist's decision whether or not to adopt OAP.

In order to identify these factors, interviews with librarians and scientists were conducted and an online survey was sent out to Dutch scientists. Fifteen interviews with librarians were conducted to provide a general overview of the OA-policy of the VSNU universities. The subsequent four interviews with scientists provided a first insight into the factors they perceive as barrier or incentive during their adoption-decision process regarding OAP. Finally, the online survey tested for these factors on a large scale. Eventually, six incentives and four barriers were identified. Personal and societal perceived usefulness, perceived ease of use of OAP, peer usage, valuation of OAP in the scientific discipline and the presence of OA-information sessions were identified as incentives in the adoption-decision with regard to OAP. The scientist's age, a scientist's career position, a large percentage of non-OA publications compared to OA-publications in the research output of a scientist and a mono-disciplinary nature of the discipline were identified as barriers in forming a positive attitude towards OAP.

Information sessions at the universities turned out to be a great way to disseminate information to scientists and will therefore contribute to the creation of awareness of OAP. In conclusion, services to stimulate OAP should at first focus on younger and/or lower-positioned scientists from multi-disciplinary fields. In order to increase the perceived ease of use and perceived usefulness of OAP such services should be organized in a way that provides as much clarity and information as possible about the process of OA-publishing.

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# PREFACE

I would like to start by thanking the people that have enabled this research. First, this research was initiated by SURFmarket in cooperation with the UKB. My special thanks go to SURFmarket for the resources offered to conduct my research and John Janssen, John Doove and Eva Woertman in particular for their enthusiasm and support during my research. Furthermore, I would like to thank Dr. Boon for his guidance and useful feedback during my research. I would also like to express my appreciation to Dr. Hoekman for taking the time to assess my report and providing me with useful critiques on my research proposal.

# 1. INTRODUCTION

Driven by a digitization of society, the academic publishing industry has undergone major changes in the past two decades, with online articles replacing paper-printed articles as the main example (Björk, 2004). In a letter to the House of Representatives of the Netherlands in November 2013, State Secretary Dekker formulated the aim to establish a full transformation towards open access (OA) to publications by 2024. The NWO[1] followed this aim by tightening its subsidy conditions in December 2015 demanding all publications that receive its funding to be published in OA (NWO, 2015). In May 2016, the Competitiveness Council of the EU took important decisions to accelerate the transition and achieve immediate OAP by 2020 (EU Press release, 2016). Within a system of OA to publications (OAP), publications are accessible online for free and for everyone without any subscription costs or restrictions to re-distribute it for non-commercial purposes (Antelman, 2004; Harnad et al, 2004; Visser, 2015). With the goals and criteria set for OAP imposed by the Dutch government and institutions and the EU, a transition towards OAP has been initiated. This is reflected by the establishment of a remarkable number of OA-journals in the last two decades.

Nevertheless, publishers of OA-journals face major challenges. For example, Uhl (2009) showed that the amount of publications in OA-journals remains low because OA-journals are in general young and therefore lack international reputation. In line with this, most scientists favour to submit their work to subscription-based journals they are already familiar with instead of to new OA-journals (Schimmer et al,2015). These findings reflect scientists' focus on the reputation of a journal instead of the rapid dissemination of and accessibility to the article - offered by publishing in OA- when it comes to deciding which journal to submit their work to (Chang, 2015; Björk, 2004, Hajjem et al, 2006). The general observations of the case studies edited by Meier zu Verl & Horstman (2011) point to one key challenge: the development of research infrastructure that operates in an open mode. According to them, openness is a way to maximise the permeability of research sources that are included in the research infrastructure. Furthermore, several researches examined the differences in valuation of OAP among the scientific disciplines. Antelman (2004) examined OA-publications among four disciplines and found that OA-articles receive greater research impact across all four disciplines, but the level of increase in citation advantage is dependent on the discipline. By looking at researcher's personal characteristics and social usage of OAP within the discipline, Eger et al (2013) found that the relevance of OAP within a discipline is primarily based on the reputation that OA-journals receive within the discipline. Furthermore, Eger et al. (2013) identified a 'wait-and-see' behaviour among scientists with regard to the decision whether to submit their papers to an OA-journal, caused by the fear of losing individual reputation when publishing in OA. These findings stress the focus on reputation once more. Other research discusses the concern that with the use of openly available scientific data, dishonest parties could mine unprotected scientific data (da Silva & Dobranszk, 2015).

To overcome these challenges and establish a successful introduction to the market, the innovation of OAP has to fulfil customer's needs and be superior to alternatives. Therefore, an understanding of potential customers and the factors influencing their decision to adopt the innovation, is important (Frambach & Schillewaert, 2002). This research regards to the scientist as the customer of OAP. After all, scientists decide in which journal they want their article to be published and thereby decide whether or not to adopt OAP. As van der Vaart (2016, p8) puts it: 'the fundamental force that will drive a change in the way scientific findings are communicated will be what scientists want'. Furthermore, Frambach and Schillewaert (2002)

[1] The Nederlandse Organisatie voor Wetenschappelijk Onderzoek (NOW) is the Dutch organisation for scientific research

define the adoption of an innovation by individuals within organizations as intra-organizational acceptance. As the innovation of OAP needs to be adopted by scientists who are employed by universities, it is regarded as intra-organizational acceptance.

The abovementioned findings provide a first insight into the challenges posed to OAP. Apart from the finding of Eger et al (2013) that it is the relevance of OAP within a scientist's discipline driving his/her decision to adopt OAP or not, these researches do not explain what makes a scientist decide whether or not to publish in OA. On the contrary, Mann et al (2009) aimed to uncover this as they questioned why a broad adoption of OAP hasn't occurred yet, while the overall attitude towards OAP among scientists is very positive. According to this research, a broad adoption is prohibited by short-term performance related concerns. Furthermore, it shows that the probability for a scientist to publish in OA is determined by the degree to which the scientist believes that OAP will benefit his career, the degree to which peers publish in OA and the scientist's individual attitude towards OAP.

In sum, existent literature has explored the challenges posed to OAP by examining the awareness of, experience with and attitude towards OAP among scientists and has also aimed to uncover factors influencing a scientist's decision whether or not to adopt OAP. However, the factors identified remain limited. This research aims to complement the range of factors influencing the decision of scientists whether to publish in OA or not. Therefore, this research aims to answer the following question:

*Which factors are regarded by scientists employed by Dutch universities as incentive or barrier in their adoption-decision process regarding OAP?*

By identifying the factors that scientists perceive as either a barrier or an incentive to publish in OAP, a better understanding of a scientist's adoption-decision process with regard to OAP can be provided. Furthermore, besides taking variables about scientists' personal characteristics and the social usage of OAP into account -like previous research did- this research will include variables with regard to the organizational facilitators of OAP. It is important to note that this research focuses on scientists aligned to Dutch universities. This focus is chosen since the research takes place in the Netherlands in the context of the Dutch institutional environment. Furthermore, scientific publications play a more integral role in the activities of scientists connected to universities than to universities of applied sciences (Chang, 2015). The research question serves two approaches. First, an explorative study consisting of interviews with librarians and scientists of Dutch universities is conducted. Hereby, an overview of the policies of Dutch universities with regard to OAP can be gained. Furthermore, it enables a first identification of factors scientists perceive as barriers or incentives for OAP. Subsequently, an online survey is spread among scientists of Dutch universities to supplement the factors as identified before to draw general conclusions on the factors influencing a scientist's adoption-decision process regarding OAP. Based on these findings, a managerial advice for SURFmarket[2] is formulated. This advice will provide a general guideline for SURFmarket on how to position itself in a model of OAP and what services and/or information could be developed and provided in order to stimulate OAP. These services and this information could ease the process of OAP for scientists and thereby spur the transition towards OAP. By doing so, scientific publications are made available to society.

[2] SURFmarket is the ICT-intermediary for Dutch educational institutions

The next section will discuss the adoption-decision theory which is used for this research and introduces the conceptual model for this research. Subsequently, the method of this research is provided by section three. Section four discusses the results of the interviews an online survey. Section five includes the discussion, followed by the conclusion of this research in section six. Finally, section seven provides a managerial and policy advice on OAP.

# 2. THEORY

*This chapter elaborates on the theories on the adoption-decision process of innovation, followed by a review of previous researches on OAP on which the hypotheses for the further stages of this research are based.*

## 2.1 Innovation adoption theories

For an innovation to sustain, it has to be introduced to and diffused through the market successfully. Rogers (1995) popularized his theory on the diffusion of innovations in order to explain how, why and at what pace innovations diffuse through society. According to Rogers (1995, p.21) the adoption process 'is a sequence of stages a potential adopter of an innovation passes through before accepting a new product, service or idea'. To establish a successful introduction and eventual diffusion to the market, potential customers have to adopt the innovation. This indicates the importance of an understanding of the potential customer and the factors influencing his/her decision to adopt the innovation (Frambach & Schillewaert, 2002).

Within the extensive field of innovation-adoption theories, Frambach and Schillewaert (2002) provide a framework for innovation-adoption within organizations. As this framework is built on existing theories on innovation adoption, information systems and organizational-science literature, using this framework enables examining the adoption-decision process with regard to OAP from a very broad theoretical background. Moreover, while other research discusses innovation-adoption within organizations in general, this framework discriminates between organizational innovation adoption (i.e. the adoption of an innovation at the level of an organization) and intra-organizational acceptance (i.e. adoption of innovation by the individuals within the organizations). This research focuses on scientists employed by Dutch universities because a scientist has to decide whether or not to adopt, and thus whether or not to accept OAP. That is, the concept of intra-organizational acceptance is regarded as the eventual goal when assessing the adoption-decision model of a scientist with regard to OAP. Therefore, the framework of intra-organizational acceptance is used to identify and complement existing literature on the factors influencing a scientist's adoption-decision. Frambach and Schillewaert's (2002) framework of intra-organizational acceptance is presented in Figure 1.

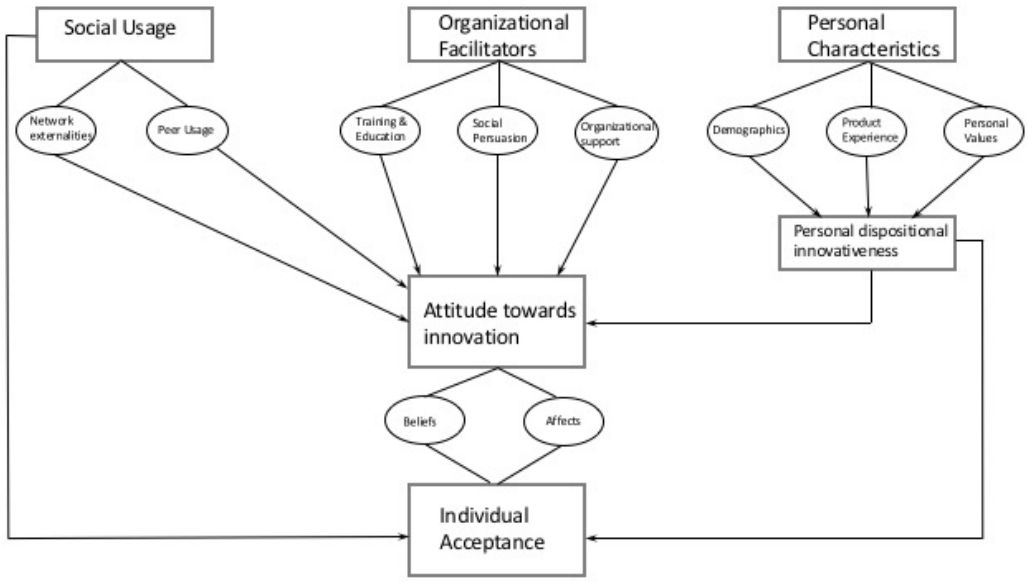



*Figure 1. Intra-organizational framework of individual innovation acceptance in organizations (Based on: Frambach&Schillewaert, 2002)*

Central in this framework is an individual's attitude towards the innovation, which consists of the individual's perceived beliefs and affects. This attitude might change or be influenced by the external stimuli of social usage and organizational facilitators with regard to the innovation. Furthermore, someone's personal characteristics influence a person's dispositional innovativeness that influences the attitude indirectly. Eventually, a person's attitude towards an innovation, the social usage and his personal dispositional innovativeness form an individual's acceptance (or rejection) of an innovation.

Figure 2 shows the theoretical framework for this research which is based on the framework of Frambach & Schillewart (2002). The concept of individual acceptance is left out as this research focuses on a scientist's attitude towards OAP instead of the eventual individual acceptance of OAP. This focus is chosen since the decision whether or not to accept OAP follows from either a positive or a negative attitude towards OAP. As shown in Figure 2, the attitude towards OAP is formed by the scientist's perception of barriers and/or incentives with regard to OAP. Furthermore, Figure 2 shows that variables such as age, progress in career, personal values and other personal characteristics are measured directly. Therefore, the concept of personal dispositional innovativeness is left out of the model. Hereby, the influence of these variables on a scientist's attitude towards OAP is assessed directly and the conceptual model is simplified. Acquiring information on what factors influence scientists' attitude towards OAP in what manner, enables the formulation of advice on how to achieve individual acceptance with regard to OAP among scientists.

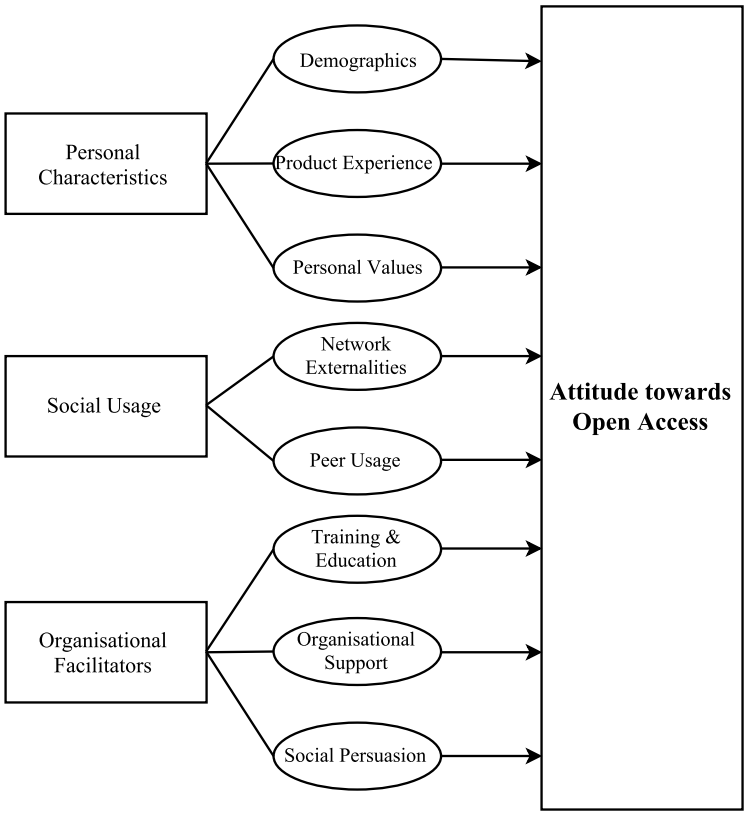



*Figure 2. Theoretical model of a scientist's attitude towards OAP (Based on: Frambach&Schillewaert, 2002*

## 2.2 Hypotheses

*This research aims to identify the factors scientists perceive as either a barrier or an incentive in their decision whether or not to adopt OAP. Before asking the scientists themselves through interviews and an online survey, this section will provide a review of previous studies on scientific (OA) publishing. Based on these previous studies, thirteen hypotheses are proposed. The intra-organizational factors serve as a guideline for the interview questions and the construction of the survey. Therefore, the hypotheses proposed in this section are structured around the intra-organizational factors as well. Figure 3, which is presented in section 2.3, eventually visualizes the hypothesized influence of the three intra-organizational facilitators and presents the indicators used to measure these influences.*

### 2.2.1 Personal characteristics

Most scientists favour to publish in a traditional subscription-based journal with an established reputation instead of an OA-journal (Chang, 2015; Björk, 2004; Schroter et al, 2005). When looking at the age of a scientist, it appears to be that young scientists look at reputation in a more encompassing way than their older peers. Apparently, younger scientists consider serving the community, publishing in literature reviews or books and the production of open educational resources as more important for their careers than older scientists do (Jamali et al.,2015). Hypothesis 1 aims to test for this question:

*H1: The younger the scientist is, the more likely it is that he/she holds a positive attitude towards OAP.*

Nevertheless, conducting research and disseminating research via publications in journals or books remain top activities for scholars, regardless of age (Jamali et al, 2015). Asking about the chance to deposit a paper in a repository, Eger et al. (2013) revealed that only publications in journals are perceived as facilitators for career advancement and therefore scientists may still be reluctant to deposit their work in a repository. For this reason, the question whether young scientist would indeed be more likely to publish in OA rises. After all, looking at the prospective for career advancements, publishing in OA could be of less importance than publishing in a highly-ranked journal that is non-OA. Additionally, it should be noted that in general, older scientists occupy more advanced career positions than their younger peers. Zuckerman & Cole (1994) showed that once a scientist has established a reputation through accomplishing academic achievements (e.g. academic laureates) and is therefore regarded as an eminent scientist, he will be more likely to choose a high-risk, unconventional topic for his research. Therefore, it seems likely that an eminent scientist is less focused on which journal his article is published in; his achievements will make his own name sufficient for other scientists wanting to read his work. This finding raises the question whether Chang's (2015) finding on the preference for publishing in subscription-based over OA-journals counts for all scientists, or whether this preference diminishes when a scientist has accomplished certain academic achievements. Therefore, hypothesis 2 proposes an alternative hypothesis to hypothesis 1:

*H2: The more progressed the career of a scientist is, the more likely it is that he/she holds a positive attitude towards OAP*

A survey among German scholars shows that while German scientists in general hold a very positive attitude towards OAP, the actual share of OA-publications and thereby the experience of publishing in OA remains very limited (Kronung et al., 2010). Jamali et al. (2015) showed that scientists are unsure about using digital platforms when they have little knowledge of and/or experience with the platforms to judge them. As a result, they could often not see the

benefits of using them. Extrapolating these findings to OAP, it seems likely that the way to convince scientists of the benefits of OAP, is by making them actually publish in OA instead of subscription-based journals they might be used to publish in. This assumption is based on the thought that scientists could be 'locked-in' to their way of submitting their work to specific journals. This leads to the following hypotheses:

*H3: The more a scientist has published in subscription based journals, the less likely it is that he/she holds a positive attitude towards OAP*

In the research of Schroter et al (2005) almost all contacted authors supported the concept of OAP. Benefits for themselves -but other scientists as well- were named when asking why they support OAP. Among these benefits, easier and faster literature searching and a faster dissemination of results to a wider audience were named as important factors. Furthermore, 46% of respondents in a research by Swan & Brown (2004) indicated not to have published in the journal if it had not been OA compared to 20% of the respondents that would still have published in the journal if it wouldn't have been OA. In addition to the aforementioned finding of Hajjem et al (2006) and Björk (2004) that OA-journals are disseminated more quickly, increase the citation rate and the accessibility of an article, this raises the question whether authors are more likely to publish in OA, once the author perceives OAP useful to his career and/or society. The following hypotheses assess this:

*H4a: If a scientist regards to OAP as beneficial to his/her career, it is more likely that he/she holds a positive attitude towards OAP.*

*H4b: If a scientist regards to OAP as beneficial to society, it is more likely that he/she holds a positive attitude towards OAP.*

However, Schroter et al (2005) found that a journal being OA was not a decisive factor for authors when selecting a journal. Instead, scientists focus on the visibility and impact of the journal. Moreover, scientists often publish in a journal where they have published in before, as they are used to the submission process (Ibid). This result seems to imply that it is more important to a scientist at what ease he can publish an article in a certain journal. Hypothesis 7 will delve into this:

*H5: If a scientist regards to OAP as easy to use, it is more likely that he/she holds a positive attitude towards OAP.*

### 2.2.2 Social Usage

According to Chang (2015), the amount of research collaborations has increased because scientists have recognized that collaborations increase the research productivity, visibility and efficiency. The degree to which collaborations takes place differs more between scientists working in different fields than scientists from different countries (Jons, 2007). Where 92.3% of the German publications in physics were performed in collaboration, a great individuality existed among the arts and humanities scholars. For example, only 15,7% of the total output in psychology were joint publications (Ibid). It can be argued that articles with one or only a few authors aiming for a research visibility as high as possible are more likely to be published in OA, since they have to make up for the lack of research productivity, visibility and efficiency due to the limited amount of authors affiliated to the article. Furthermore, articles with multiple authors could have fewer urge to publish in OA for these reasons. Additionally, the personal believes of one scientist wanting to publish in OA have much fewer impact on the decision

where to publish for articles in a group of multiple authors, since all involved authors have to agree upon the publication. This leads to the following hypothesis:

*H6: The more authors are involved with the writing of an article, the less likely it is that these authors hold a positive attitude towards OAP*

The establishment and development of OA-journals, the degree to which OAP is perceived as relevant, and the reputation of OAP differ between academic disciplines (Chang, 2015; Eger et al, 2013). It is however not yet proven whether scientist from certain disciplines indeed hold a more positive attitude towards OAP than scientists from other disciplines. The following hypotheses will test this:

*H7: The discipline in which a scientist works, influences the attitude of a scientist towards OAP.*

Additionally, OA-articles are cited more frequently and are more easily disseminated, which also improves the research visibility (Hajjem et al., 2006; Bjork, 2004). Therefore, one could argue that a scientist from a mono-disciplinary field would regard OA as less important because his research could be primarily focused on his own discipline and therefore does not aim for a dissemination as wide as possible per se. This assumption is tested with the use of hypothesis 8:

*H8: If a scientist works in a mono-disciplinary field it is less likely that he/she holds a positive attitude towards OAP.*

Finally, Swan & Brown (2004) identified that 47% of the respondents could identify an OA-journal to publish in on the recommendation of a colleague, in great contrast with only 6% of the respondents that identified an OA-journal to publish in with advice of a librarian. Therefore, it seems likely that a scientist is influenced by the way of publishing of his/her peers. If his/her peers perceive an OA-journal as a great journal to publish in, it seems likely that a scientist is more likely to regard to OAP positively as well. This leads to the following hypothesis:

*H9: The more peers publish in OA, the more likely it is that a scientist will hold a positive attitude towards OAP.*

### 2.2.3. Organizational Facilitators

After the Berlin declaration on OA, all 13 Dutch universities have adopted OA policies by implementing the policy to self-archive their research output (Harnad, 2005). However, the way these policies are executed and maintained differs among the universities. For example, in an overview of the situation around OA in 2008, Suber (2009) pointed out that all universities have an OA policy and that the three technical universities of Delft, Eindhoven, and Twente, announced the plan to create a data repository for this consortium. The Utrecht University has enacted an OA-fund in order to stimulate OAP among its scientists (Universiteit Utrecht, 2016). These are examples of different OA-policies that raise the curiosity whether the OA-policy of a university and the way this policy is maintained, influences a scientist's attitude towards OAP.

For example, a university can appoint someone to focus on the topic of OAP to answer questions of scientists on OAP. If such an OA-expert is available to a scientist, concerns about OAP can be taken away and the scientist could feel more positive about publishing in OA. A university could also choose to organize information sessions (e.g. lunch sessions and workshops) to inform scientists about the possibilities of OAP. With these sessions, awareness

of the possibility to publish in OA is increased or even created, which could lead to an increase in OA publications. Furthermore, if universities implement a mandate that demands its scientists to deposit their work into a repository, or to publish in OA, it seems plausible that scientists would publish in OA sooner. However, it could also be that a university indeed has an OA-mandate, but does not demand its scientists to comply to this policy. The following hypotheses will examine whether a university stimulates OAP and how this affects the likelihood of a scientist to publish in OA:

*H 10: If there is an OA expert present within the university, a scientist is more likely to hold a positive attitude towards OAP.*

*H11: If there are information sessions about OAP within the university, a scientist is more likely to hold a positive attitude towards OAP.*

*H12: The stricter the OA policy of the university to which a scientist is connected is, the more likely it is that a scientist holds a positive attitude towards OAP.*

As mentioned in section 2.2.3, the way OAP is perceived differs per discipline. For example, scientists within the science disciplines seem to recognize OAP more than scientists from other disciplines (Coonin, 2011). Also, OA-articles perceive a different citation advantage dependent of the discipline the research is conducted in: in the field of philosophy this increase is 45%, compared to an increase of 91% in mathematics (Antelman, 2004). Looking at the organizational structure, scientists are in fact distributed over the academic disciplines and faculties. Looking at organizational facilitators, the way OAP is valued among a scientist's discipline –or faculty- therefore seems very important in his adoption-decision process with regard to OAP. Hypothesis 13 tests whether this is indeed the case:

*H13: The more OAP is appreciated within the discipline a scientist works, the more likely it is that he/she holds a positive attitude towards OAP*

## 2.3 Conceptual Model

Figure 3 presents the conceptual model, including the hypothesized influence of the different variables on a scientist's attitude towards OAP according to the hypotheses.

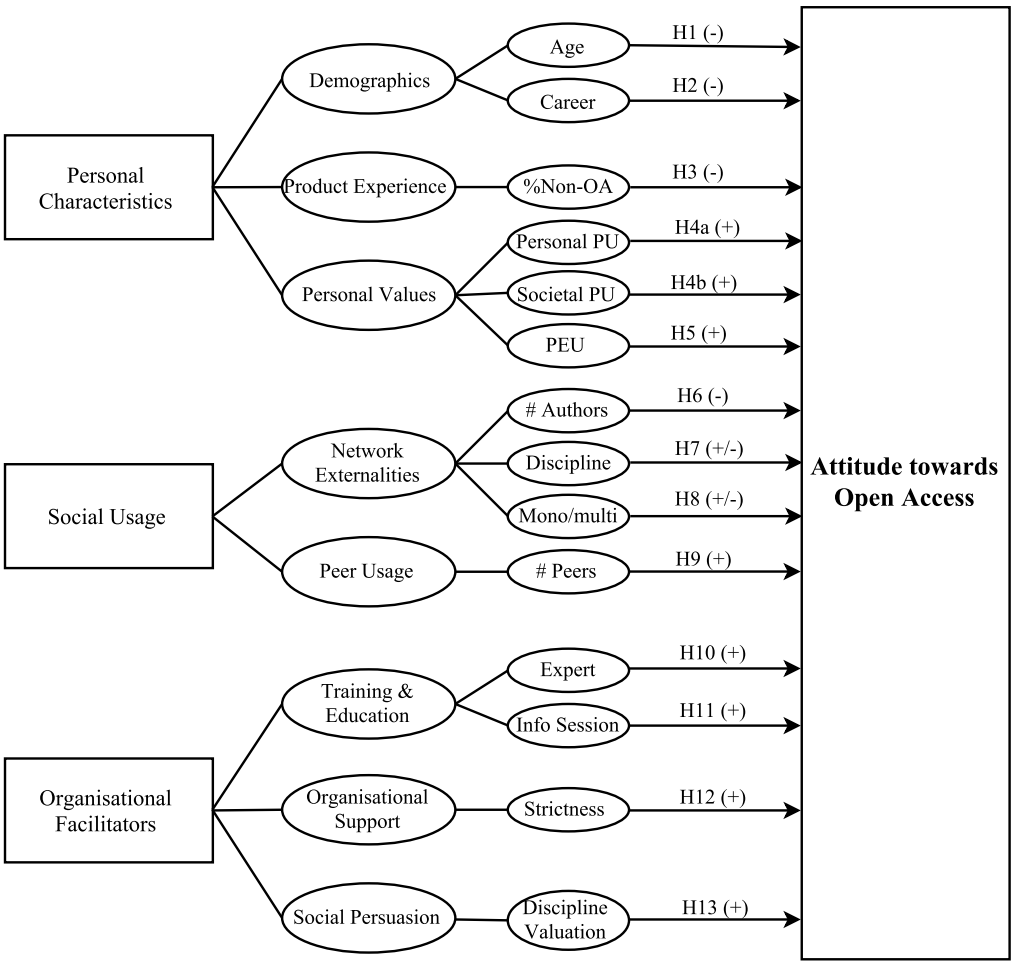



*Figure 3. Conceptual model of a scientist's attitude towards OAP, including the expected influences of the variables on this attitude.*

# 3. DATA

*This section discusses the methodology for this research. As this research consisted of three rounds (i.e. interviews with librarians, interviews with scientists and an online survey among scientists), this section discusses the method for each of these three rounds.*

## 3.1 Methodology

### Interviews

The qualitative part of this research consists of two explorative rounds of interviews. First, librarians of the VSNU[3]-member university libraries are interviewed. The librarians from the VSNU-member universities in the Netherlands were interviewed because they are assigned with the operations of OA for their university. By these means, insight could be gained into what the OA-policies of Dutch universities look like and what their OA-activities are. But more importantly, these interviews provided insight into the attitude towards OAP of Dutch universities. The interviews were of a semi-structured design. This means that the interviewer could add follow-up questions and the interviewee has the room to add some additional information on a specific subject, while a general line in questioning for each interview is guaranteed (Bryman, 2012).

Second, scientists employed by Dutch universities were interviewed. Hereby, a first insight insight into the scientists' attitude towards OAP could be acquired as the scientists were asked about their knowledge of and experience with OAP. Also, these interviews provided insight into whether the attitude of librarians and scientists with regard to OAP correspond to each other. These interviews were of a structured design in order to reduce the time needed to conduct the interview, but to enable an acquisition of information about the same topics for each interviewee. The questions for both rounds of interviews were structured around the intra-organizational factors as discussed in the theory section and the proposed hypotheses from the previous section. The results of the first round of interviews were used to finalize the questions for the second round of interviews. For example, some questions were removed from the list that had shown to be unclear, or by adding some extra follow-up questions about topics that had shown to result in very extensive answers. More importantly, the results of the two rounds of interviews served as a guideline for the composition of the questions for the online survey. After transcribing, labelling and coding the results, the results were classified under several final codes. These final codes served to structure the questions for the survey, as they provided a first insight into the factors scientists employed by Dutch universities perceive as incentive or barrier in their adoption-decision process for OAP. Performing an online survey enabled testing these factors for a large sample of scientists.

### Online Survey

In order to draw general conclusions on what factors are regarded as incentives or barriers by scientists to adopt OAP, it is necessary to reach a wider scope of scientists (Bryman, 2012). Performing an online survey enables this. An online cross-sectional survey was sent out to scientists of the Dutch universities. A cross-sectional design was chosen as this research does not aim to monitor the perceived barriers and incentives for OAP over a certain time. Therefore, scientists were asked to fill in the questionnaire once. This questionnaire is presented in appendix B.

[3] The Vereniging van Universiteiten (formerly known as Vereniging van Samenwerkende Universiteiten, hence the abbreviation of VSNU) is the joint association of Dutch universities

Table 1. shows the variables and indicators and the categories they have been assigned to, which are used to determine the presence of intra-organizational factors. Identifying the (lack of) presence of these intra-organizational factors help explaining the attitude towards OAP. Each question was set up to provide insight into a variable. For example, when looking at how the organizational facilitators affect a scientist's attitude towards OAP, scientists are asked whether their institution stimulates OAP. Whether an institution stimulates OAP is measured by asking about the universities' policies and services provided by the institutions. An institution could for example organize information sessions about OAP, or implement a strict policy with regard to OAP.

*Table 1. Variables and indicators*

| Intra-organizational factor | Category | Variable | Indicator(s) |
|---|---|---|---|
| **Personal Characteristics** | Demographics | • Age<br>• Gender<br>• Career position | • Age in years<br>• Male or Female<br>• Function at the university ranging from PhD-candidate to Professor |
| | Product Experience | • Amount of OA-publications | • Percentage of OA-journals of the total publications |
| | Personal Values | • Personal perceived usefulness (PU) of OAP<br>• Societal perceived usefulness (PU) of OAP<br>• Perceived ease of use (PEU) of OAP | • Perceived usefulness to career indicated with a Likert-scale<br>• Perceived usefulness to society indicated with a Likert-scale<br>• Perceived ease of use indicated with a Likert-scale |
| **Social Usage** | Network Externalities | • Academic discipline<br>• Monodisciplinarity of the discipline<br>• Amount of authors affiliated to an article | • Humanities, social sciences, life science, health sciences, or physical sciences<br>• Monodisciplinary, interdisciplinary or multidisciplinary discipline<br>• Nr. of authors per article |
| | Peer Usage | Peers publishing in OA | Amount of OA-articles of peers read in numbers |
| **Organizational Facilitators** | Training and Education | Dissemination of information regarding OAP | • Presence of OA expert<br>• Presence of OA information sessions |
| | Organizational Support | Stimulation of OAP by the university | • Presence of funding<br>• Presence of technical support<br>• Level of strictness of the university's OA-policy |
| | Social Persuasion | Valuation of OAP within discipline | Degree to which OAP is common practice within the discipline ranging from unusual to common |

## 3.2 Population & Sample

### Interviews

In order to acquire insight into the OA-activities of all Dutch VSNU-member universities in general, each university library was contacted. If the university has a medical centre, the medical library was contacted as well. All, except one (i.e. TU Eindhoven) agreed upon an interview. For one university (i.e. UvA), only an interview with a librarian from the medical library was arranged. This resulted in 15 interviews, including 2 interviews with librarians of a medical library (i.e. the AMC and LUMC). Herewith, the different VSNU-universities are well-represented in the sample.

By reaching out to scientists from all 14 VSNU-members, the full range of Dutch universities is covered. To assure diversity in the group of scientists interviewed in the second round, an aggregation of the different scientific disciplines was made. Elsevier publishes 23% of the total Dutch output and thereby is the largest scientific publisher in the Netherlands (VSNU, 2015). Besides its publisher activities, it owns the academic search tool Scopus. Therefore, the categories defined in the Scopus search machine were used for aggregating the academic disciplines of Dutch scientists. Scopus defines four subject areas: life sciences, health sciences, physical sciences and social sciences & humanities. Subsequently, Scopus classifies publications in one of the 27 categories[4] (Vieira&Gomes, 2009). To ensure simplicity, this research will use the four broader subject areas. Table 4 in appendix A provides an overview which will be used to assign the scientists to one of the four subject areas. The interviewees included a PhD-student at the institute of Mathematics at the Utrecht University, a professor by special appointment in Library & Information sciences of the UvA, a lecturer in Bio-informatics of the TU Delft and a professor in Life Sciences of the Utrecht University. Therefore, these interviewees respectively cover the disciplines of physical sciences, Social Sciences, and Life sciences. While the discipline of Health Sciences is not directly covered, the interviewed professor in life sciences at the Utrecht University is also regarded as a scientist in Health Sciences, because of the fact that his work involves the study of biological challenges.

### Online Survey

The population for this research consists of scientists employed one of the Dutch VNSU-member universities. These universities employ a total of 25.395 full-time equivalent (FTE). Anno 2014, this amount of FTE consisted of 2.648 (10,4%) FTE professors, 2.224 FTE (8,8%) associate professors, 4.830 FTE (19%) lecturers and 8.714 FTE (34,3%) PhD-Students. The remainder of scientific personnel included 6.979 FTE (27,5%), which mainly entail (post-doc) scientists (Rathenau Instituut, 2016a). The gender distribution among researchers employed by Dutch research institutions is 63.2% male vs. 36.8% female researchers (Rathenau Instituut, 2016b). The sample-size of this online survey was 233 individual scientists and therefore covered 0,92% of the total population of Dutch scientists. Among the respondents, 11% is a professor, 7% an associate professor, 19% a lecturer, 28% a PhD-Student and 35% belonged to the remainder of scientific personnel (i.e. junior scientist, (post-doc) scientists, assistant professor, professor by special appointment and professor with administrative duties), indicated by Figure 4. Additionally, as shown by Figure 5, 67.7% of the respondents is male and 32.3% is female. Looking at the distribution of the functions and gender of scientists in the sample, showed great resemblance with this distribution of the population, justifying the use of this relatively small sample.

[4] Actually, Scopus defines 26 separate categories and the category 'multidisciplinary' for publications that include a combination of disciplines

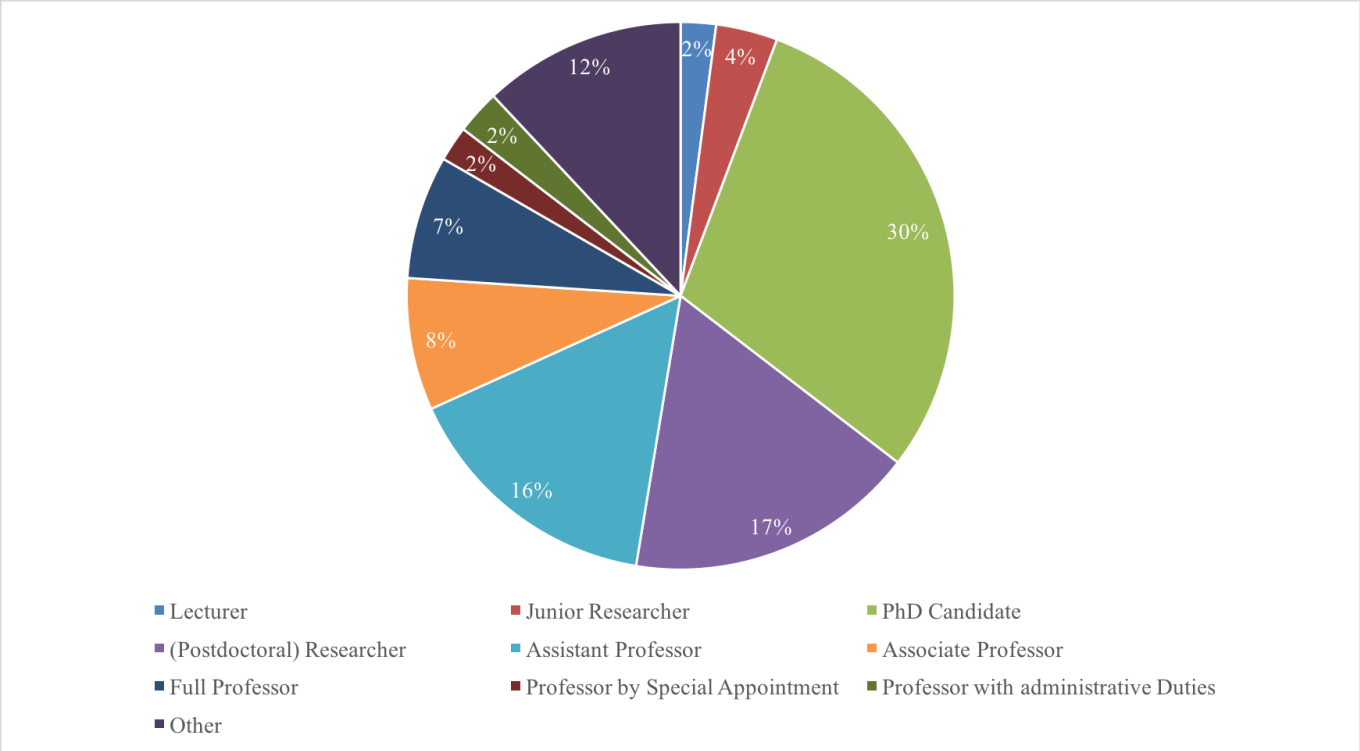



*Figure 4. Distribution of functions among the respondents of the online survey*

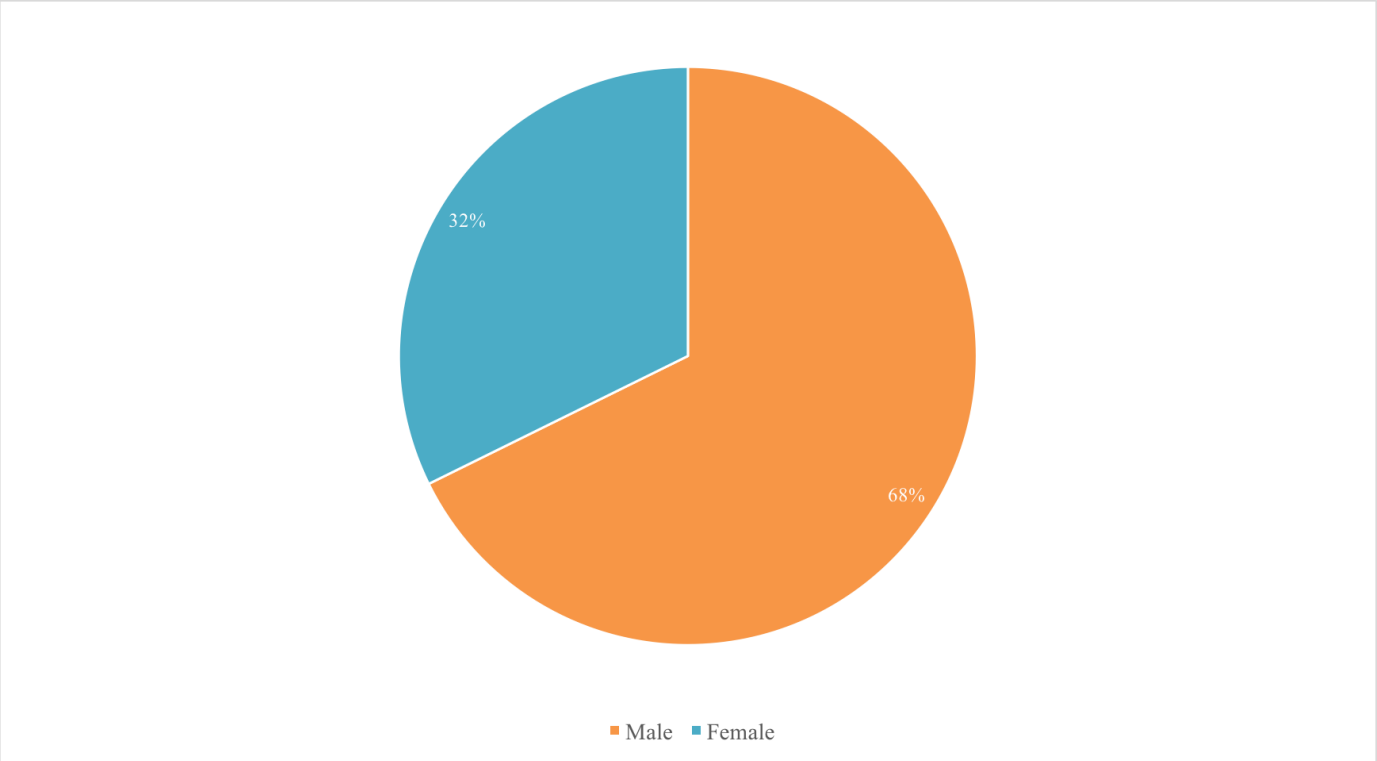



*Figure 5. Distribution of gender among the respondents of the online survey*

## 3.3 Data collection

### Interviews

To arrange the interviews with librarians, the general e-mail address –or the OA-information e-mail address- available at the website of the university libraries was contacted.

The scientists were approached via e-mail. The contact addresses were collected in two ways. First, employees of SURFmarket shared their contact addresses of acquainted scientists. Second, the librarians interviewed in the first round were asked to recommend several scientists. By mentioning that someone has recommended them for this research, the scientist could feel more designated to cooperate. In order to guarantee the diversity among the interviewees and to prevent the sample from having a bias with regard to the attitude towards OAP, the employees of SURFmarket and the librarians were asked to recommend scientists of different ages, from different disciplines and with different attitudes towards OAP. As this round of interviews was set up to test whether the librarians perceptions of scientist's attitudes towards OAP correspond to the perceptions of scientists, four interviews with scientists from different ages, gender and scientific disciplines were conducted to acquire a first insight. Also, these interviews were used to complement the factors influencing a scientist's adoption-decision with regard to OAP as identified from the first round of interviews. These identified factors subsequently were used to structure the survey questions.

### Online Survey

Appendix B displays the list of questions the respondents were asked to complete. The list of questions is structured according to the variables and indicators for the intra-organizational factors as presented in Table 1. For example, the scientists are asked how many scientific articles they have already published and how many of those have been published in OA. These results are used to assess the scientist's product experience.

Before the survey was put online, two scientists agreed to participate in a test-round for the online survey. These scientists received the link to the online survey with the request to provide information about questions that were unclear, missing answering options, spelling mistakes, etc. With the use of this information, the online survey was finalized. To reach out to scientists of all Dutch VSNU-member universities, the URL to the online survey was sent to each interviewed librarian and scientist. The first were asked to disseminate the URL among the scientists of their university through newsletters, intranet or social media of the university. The latter were asked to do the same, in addition to filling in the questionnaire themselves.

Additionally, the request to complete the online survey was also posted on social media (i.e. Twitter and LinkedIn) using the hashtags '#openaccess' and '#opendata' as this enables each scientist to access the survey. The Twitter-accounts @SURFmarket and @SURFspot with respectively 1.271 and 3.264 followers were used to spread the word about the online survey.

Furthermore, a short introduction on the research with the request to fill in the questionnaire and to disseminate the survey among peers was posted on the webpage 'www.openaccess.nl'. This same request was also included in the online newsletters of SURFmarket and SURFspot, which were sent to 4200 employees of educational institutions in the Netherlands.

Lastly, I attended the EU Open Science Conference in Amsterdam on 4 and 5 April 2016. Here, I gathered extra information on the topic and collected more contact addresses of people working in the academic community that agreed upon helping me disseminating the online

survey. During the days of the conference, the hashtag '#EU2016NL' was used in the tweets about the research to raise awareness about this research among the participants of -or those interested for- the conference.

## 3.4 Data preparation

### Interviews

The interviews with librarians lasted for 45 minutes up till 1 hour and 25 minutes. The interviews with scientist lasted for 20 up till 40 minutes. With the permission of the interviewees, all interviews were recorded to be transcribed word-to-word later on. Recording and transcribing the interviews at a later point in time made sure no information was lost. Furthermore, it enabled the researcher to pay full attention to the interview, as taking notes was not necessary.

### Online Survey

The output of the collected data was firstly recoded to numeric values in order to prepare the data to be imported to SPSS. Subsequently, it was controlled for missing values. The answers of 41 of the respondents had to be excluded from the dataset as they were incomplete or did not comply to the criteria set for sample. One respondent was excluded as he was employed by The Hague University, which is a university of applied sciences and not a member of the VSNU. Five respondents were excluded as they were employed by a non-Dutch university. Two respondents were excluded because they were no scientists. Lastly, the data for the answers of 34 respondents were excluded as they did not complete the entire questionnaire. This resulted in a final dataset of 192 respondents.

## 3.5 Data analysis

### Interviews

First, the transcripts were read to attain a first general overview. Then, the transcripts were read again, but now per question and line by line. This was done to attain a general overview of the resemblances and/or differences in answers among the interviewees. While reading, relevant fragments were marked. Fragments were regarded as relevant when a statement was repeated, referred to as important, resembled an earlier interview or theory, when it was a surprising statement, or simply because it was relevant to an intra-organizational factor from the theoretical framework.

To draw up an overview of these fragments, coding tables were set up per question. Doing so, provided an allocation of the fragments to one of the intra-organizational factors from the theoretical framework. Also, the fragments were labelled. Subsequently, labels that showed resemblances were grouped together. From these groups of labels, final codes were derived. The fragments with the same final codes were grouped together in a final coding table, which are included in appendices C and H. The coding table used for the analysis of the interviews is shown in Table 2.

*Table 2. Coding scheme*

| University (library) | Fragment | Intra-organizational factor | Label | Code |
|---|---|---|---|---|
| | | | | |

### Online Survey

The survey was structured around the intra-organizational factors as discussed in the theory and the insights gained by the interviews. Appendix B includes the list of questionnaire in which the questions are assigned to an intra-organizational factor. The results of the online survey are used to test for the hypotheses. The first hypothesis examines the influence of the variable age on the attitude of the scientist towards open access. As the dependent variable of attitude towards OAP is ordinal and age is a scale-variable, a spearman rho-analysis is performed to test for *hypothesis 1*.

*Hypothesis 2* focuses on the the influence a scientist's position at the university might have on his attitude towards open access. The variable 'function' provides information on a scientist's career progress as it denotes which function a scientist has at the university. By calculating the spearman correlation for the effect of the progress in career on a scientist's attitude towards OAP is tested.

To test for *hypothesis 3* and whether it is indeed the case that the level of experience with subscription-based publishing influences a scientist's attitude towards OAP, first the percentages for OA- and subscription-based publications are calculated. This is possible as the respondent was asked how many articles he has published in total and how much of these were published in OA. Subsequently, the Spearman correlation for the percentage of subscription-based publications with the attitude towards OAP is calculated.

*Hypothesis 4a and 4b* respectively look at the influence of the perceived usefulness (PU) of OAP to a scientist's career and to society. As the question whether OAP is perceived as useful to their career or society could be answered by ticking one of the five options of a Likert scale (ranging from totally disagree to totally agree), spearman correlations for the personal PU (i.e. the PU for a scientist's career) and the PU for society with the attitude towards OAP are calculated. For *hypothesis 5*, which claims that once a scientist perceives OAP as easy to use he is more likely to hold a positive attitude towards OAP, the same steps are taken for the variable concerning the perceived ease of use.

The variable 'number of authors' is used to test for *hypothesis 6,* which hypothesizes that the more authors are affiliated to an article, the less likely it is for scientists to hold a positive attitude towards OAP. As this is a scale variable, again a spearman's correlation is calculated. The average amount of authors involved with the writing of one article can differ greatly between different disciplines. Therefore, it will be controlled for whether the correlation between the academic discipline and the average amount of authors affiliated to an article is too high.

To test for *hypothesis 7* regarding the discipline a scientist works for, two analyses are conducted, a Kruskal Wallis analysis is performed for the variable 'discipline' as this variable is categorical with more than three levels. The respondents were also asked whether their discipline could be best described as mono-, inter-, or multidisciplinary. This categorical variable is used to test *hypothesis 8* by making use of a Kruskal-Wallis analysis because the categorical variable includes more than two levels.

Then, *hypothesis 9* concerning the influence of peers publishing in OA is tested by calculating the spearman correlation for this ordinal variable with the independent variable of a scientist's attitude towards OAP.

*Hypothesis 10 and 11* are tested by first excluding the respondents that answered not to know whether there are OA-experts available or OA-information sessions organized at their university. This is done because the influence of the presence of these variables can only be tested when the scientist is aware of its (lack of) presence. After excluding these answers, performing a Man Whitney analysis allows to test for the influence of the presence of OA-experts and for the presence of OA-information sessions on the attitude towards OAP.

As there were 5 questions about the OA-policy of the university (i.e. whether the university stimulates OAP, discourages OAP, maintains a strict OA policy, offers an OA fund and offers support for the registration of OAP), the variables 'University stimulates OA', 'University discourages OA', University has an OA policy', 'University offers an OA-fund' and 'University provides support for OA-registration' first have been grouped into one ordinal variable. This variable is in fact the sum of all the values given for the 5 variables. Creating one variable out of these 5 separate variables allows to perform a spearman correlation to test *hypothesis 12*.

Finally, hypothesis 13 is tested by examining whether the way OAP is appreciated within the discipline a scientist works, influences his attitude towards OAP. For this aim, the spearman's correlation for the valuation for OAP within the discipline with a scientist's attitude towards OAP is calculated.

# 4. Results

*This section presents the analysis and interpretation of the data collected by the interviews and online survey.*

## 4.1 Interviews with librarians

From the transcripts of the interviews with librarians 8 final codes were derived. Appendix C shows the coding tables for selected fragments from these interviews structured per intra-organizational factor to which the fragments were classified and the final code they have been assigned to. This section discusses the most striking fragments for each of the 8 final codes.

### 4.1.1 Perception of OAP

The code '*perception of OAP*' is assigned to fragments in which a librarian does not just describe or define OAP, but provides insight into the way he perceives the concept. These fragments are therefore classified to the intra-organizational factor of personal characteristics and are presented by Table 5 of appendix C. The perceptions of OAP remarkably differ greatly among the librarians and can be divided into three 'groups': librarians that hold a positive, neutral or sceptic attitude towards OAP. The following fragments obviously belong to the first group:

*"I am a supporter of open access publishing for the full 100%."*

*"I am a fierce proponent of open access."*

*"We are open access advocates"*

However, not all librarians are that enthused by the concept of OAP who are therefore classified to the group of librarians that hold a sceptic attitude towards OAP. For example, one librarian stated that OAP would increase the financial burden for the publishing institutions:

*"Open access will increase the costs for us: the writing and publishing institutions."*

Another librarian questions if OAP would render an actual benefit to society in the following fragment:

*"I question what the added value for society is by making articles OAP as a lot of research is too technical or complex for the normal reader and specialised researchers already have access to the information they need."*

Also, some librarians support the green road to OAP, but criticize the golden road:

*"I am both a supporter and an opponent of open access publishing [...] I am a supporter of the green road and a criticizer of the golden road to open access publishing."*

Besides these OA-criticasters, there were also librarians that regard OAP neutrally, reflected by the following fragments:

*"My attitude with regard to open access is neutral as I do not think it is always relevant."*

*"I am a careful supporter of open access. Hereby I mean that open access delivers both advantages as disadvantages to scientists"*

Furthermore, there are fragments were the librarian provides us not only with an insight into his/her perception of OAP, but outlines his/her perception of the goal of OAP as well. The main perception of this goal is to disseminate scientific knowledge an accelerating science, captured in the following fragment:

"*OAP is a way to disseminate scientific knowledge, but moreover to accelerate scientific processes."*

Another librarian added to this:

*"We aim to advance science. To me, OA is a way to accomplish that"*

In conclusion, several librarians are OA-advocates, which they explain by stating that OAP is a way to advance science by disseminating scientific knowledge and even more importantly, by accelerating scientific processes. Other librarians expressed their scepticism with regard to OAP as they doubt whether OAP would actually benefit science, or even expect OAP to increase the costs of publishing. Lastly, some librarians acknowledged both these advantages and disadvantages incurred by publishing in OA and therefore took a neutral position with regard to OAP.

### 4.1.2 Description of OAP

As Table 7 in appendix C shows, the fragments coded with *'description of OAP'* mostly provide insight into what librarians regard as criteria that should be complied to for something to be open access. These criteria include that the publication should be accessible worldwide through the internet and for free. Furthermore, it should be reusable as well. Besides describing criteria for something to be OA, some librarians describe OAP as a movement, financial transition or even as a business model:

"*OA is the movement that is trying to make scientific literature freely available to anyone"*

### 4.1.3 Barrier for OAP

Fragments in which the librarian describes a '*barrier for OAP*' have been assigned to the intra-organizational factors of social usage and organizational facilitators. Table 8 in appendix C shows the fragments coded as a barrier for OAP and classified to social usage. These fragments show that among scientists a general distrust for the quality of OA-journals and the fear that in a system of OAP other people are in control of what gets to be published exist. Also, a librarian mentions that open access isn't always possible due to privacy or ethical constraints. Furthermore, the following fragment reflects the striking result that according to this librarian, scientists not always regard OAP as something useful:

*"[…] it is an absurd idea that any citizen should be able to read scientific information, as this information is often too complex for them to understand […], they say."*

The fragments assigned with the code *'barrier for OAP'*, but classified to organizational facilitators are presented in Table 11 in appendix C. Looking at this table, the amount of fragments criticizing the scientific evaluation is striking. The general line of critique in these fragments is that the current way of evaluating scientists and their work poses major barriers to

OAP. For example, the following quote shows that due to a focus on prestige and impact factors, scientists sometimes have no other choice than to publish a non-OA journal because they are supposed to do so, even though they actually wish to publish in OA:

*"A PhD candidate told me that she simply doesn't always have the choice to publish in open access as her supervisor tells her to focus on her career."*

Other fragments discuss monetary constraints or business confidentiality as barriers to OAP. One librarian answers the following after being asked what the barriers for OAP are:

*"The evaluation of research hampers a transition towards OA. The second barrier is simply caused by financial constraints"*

With financial constraints of publishing in OA, this librarian refers to the article processing charges (APC's) that are often involved with publishing in OA. In conclusion, librarians addressed the current scientific evaluation system, monetary constraints faced when publishing in OA and business confidentiality as the major barriers posed to OAP. The striking result is that, according to the librarians, OAP isn't perceived as useful by several scientists.

### 4.1.4 Incentive for OAP

Almost all fragments coded as '*incentive for OAP'* are classified to the intra-organizational factor of personal characteristics. In these fragments, librarians stress the influence of the scientific evaluation system once more. Also, they mention the importance of peer usage and scientists having knowledge about OAP (See Table 6, appendix C). The following fragment from the interview with a librarian summarizes what librarians regard as factors spurring OAP:

*"The attitude with regard to open access is formed by the knowledge about OAP someone has and/or what someone hears from peers and reads in newspapers. […] What I hear the most, especially from scientists that have published in open access before, is that publishing in open access increases the visibility of an article. An increased visibility is important to scientists as their research is used more, but moreover because their evaluation is partially based on how many times their articles have been cited."*

Four fragments coded as '*Incentive for OAP'* were classified to the intra-organizational factor of organizational facilitators. These fragments –presented in Table 14 of appendix C- are mainly concerned with the influence of the OA-policies of grant providers. According to these librarians, OA-requirements of grant providers spur OAP, reflected by the following quote:

*"A factor that stimulates OA is the fact that grant providers more and more demand scientists to publish in OA"*

Summing up these results, the scientific evaluation system is again addressed as a very important factor during the adoption-decision process with regard to OAP. Also, publishing in OA seems to be influenced by the scientist's social network and requirements set by his/her research grant provider.

### 4.1.5 Services provided by university library

There is an abundant amount of fragments that provide insight into the way universities provide technical support, what facilities they offer, what their OA-policy focuses on and how they aim to achieve this. Therefore, they have been coded as '*services provided by the university library*

and are classified to the intra-organizational factor of organizational facilitators, presented in Table 10 of appendix C. The following fragments respectively reflect the services provided in terms of technical support, OA-policy and disseminating information about OAP in order to create awareness on the topic among scientists:

*"We can set up the software and arrange the DOIs or ISSN-numbers, but we can also direct them towards existing publishers."*

*"The board of the university is very positive with regard to open access publishing and the chairman of the board is regarded as a role model in open access publishing for scientists."*

*"I give presentations about the advantages and disadvantages of and the practical affairs with regard to publishing in open access."*

*"Creating awareness on open access publishing is indeed one element."*

Interestingly, fragments concerning how much time OAP asks from the university library are very dichotomous. Several librarians state that *"OA is a lot of work"*, while other librarians mention the following:

"*No, I spend a couple of hours a week on OA*"

Which implicates that OAP does not require a lot of work from the university library.

Besides this dichotomy with regard to the perception of the amount of work that OAP requires from the library, the librarians agree with each other on the fact that a university library only has an advisory task and should therefore leave the choice of where to publish to the researcher. As a librarian puts it:

*"We cannot force scientists to publish in certain journals."*

With regard to their role and the role of the university library, the librarians seem to be quite like-minded. Most of them describe the role of the university library and librarian as being a facilitator of OAP and to provide assistance to scientists, reflected by the following quote:

*"As university library, we are not a publisher. Instead, we act in a facilitating manner with regard to open access publishing".*

With regard to the future of the university library, the following fragment reflects the vision of the university library as a facilitator of open access, with the addition that this role will hardly change, but if it does it will become as follows:

*"It will be more about copyrights, towards a more facilitating and advising role."*

Furthermore, the librarians expect that the role of the library remains informative. So, while the librarians did not agree upon the amount of work that OAP requires from the university library, they did with regard to the (future) role of the university library and OAP-related services they currently provide.

### 4.1.6 Practical solution

Table 12 of appendix C provides an overview of fragments classified under organizational facilitators and codes as '*Practical solution',* as these fragments are mainly about changing the evaluation system and reducing the costs incurred by publishing in OA in order to spur a transition towards OAP. The following answer to the question what would provide a practical solution illustrates this:

*"Fewer focus on impact factors while reducing the costs."*

Some of the fragments with this code are more of a political nature, such as this one:

*"To put open access on the agenda and making a statement, the big deals concerning open access of the Netherlands were very useful. But in the end, you'll have to get other countries on board as well"*

As in this example fragment, the practical solutions mentioned in these political-tinted fragments include setting up a clear OA-policy, acting collectively- if possible on a worldwide level- and to have a close collaboration among universities.

### 4.1.7 Submission decision

Several librarians discussed the decision process about where to publish. These fragments are coded with '*Submission decision'* and presented by Table 13 in appendix C. The librarians agree upon the fact that the leading author decides where the research is published. Furthermore, they acknowledge that it's often the case that it takes until the moment of submitting a paper that scientists realize publishing could incur some costs. However, it's claimed that these costs do not withhold scientists from publishing in the journal they wish for. One librarian phrased this as follows:

"*It occurs frequently that the additional costs of publishing in OA have not been taken into account. However, these costs do not influence the choice for where to publish"*

According to some of the interviewed librarians, this has started to change since grant providers demand OA and therefore to make budget available for publishing in OA from the beginning:

*"Since grant providers have included OA into their demands, it has become something taken into consideration from the beginning. However, at this moment it's still something only thought of when the publication process is started and there's actually no research budget left"*

In line with this fragment, several librarians discussed the influence of financial support on this decision. Where all the interviewed librarians agree upon the fact that subsidies or discounts take away some barriers to publish in OA and that a subsidy is more useful than a discount, not all the interviewed librarians think that subsidies are of great importance in the decision where to publish. One librarian explains this as follows:

*"I do not think subsidies influence the decision whether or not to publish in OA for a scientist. It's about the quality of the journal and the criteria of a grant provider."*

Summing up these findings results in the conclusion that –according to librarians- subsidies stimulate scientists to publish in OA, but that the quality and prestige of a journal remains the most important factor in determining where to submit a paper.

### 4.1.8 Differences between disciplines

When discussing the way OAP is perceived within the different scientific disciplines, several librarians mentioned some differences in the way scientists regard to OAP because of the discipline they are working in. These fragments are therefore coded as '*differences between disciplines'* and classified under social usage. Table 9 of appendix C presents these fragments. One librarian for example explains that the budgetary norms vary enormously between the different disciplines, causing scientists from different disciplines to regard to paying an APC differently:

> *"It's different among the disciplines. A medical scientist will not easily get shocked by an APC of €2.000, while this is extremely uncommon for a humanities scholar"*

As reflected by this fragment, librarians state that the valuation of OAP and the perception of costs incurred by publishing in OA differs greatly among scientists from different disciplines.

### 4.1.9 Preliminary results after the first round of interviews

The results of this first round of interviews provide an insight into the OA-policies of the VSNU universities and a first insight into the way scientists regard to OAP, according to the librarians of the Dutch universities. When describing or defining open access, the librarians proposed that something should be accessible, online, for free and for everyone as the criteria for something to be OA. According to these librarians, the focus on impact and the amount of citations during the scientific evaluation process withholds scientists –the younger ones in particular- from publishing in OA. Also, they mentioned that scientists of different academic disciplines perceive OAP differently.

Looking at the incentives for scientists to publish in OA, the scientific evaluation systems is again addressed as a very important factor. Also, publishing in OA seems to be influenced by the scientist's social network and requirements set by his/her research grant provider. The more peers regard to OAP positively and the more they actually publish in OA, the more likely it is that a scientist will publish in OA as well, according to the librarians. The OA-policies and requirements for publications receiving research grants set up by grant providers play an important role in the stimulation of OAP among scientists as well. However, the librarians stated that a scientist's decision of where to submit a paper in the end is about balancing out their morals and monetary or career considerations. Asking about the activities of the university library with regard to OAP, the OA-policies of the different universities seemed to differ greatly as some librarians noted that OAP requires a lot of time and work from them, while others said to work on OAP only a couple of hours a week.

The next section will discuss the results of the second round of interviews in order to assess whether the factors scientists themselves identified as barriers or incentives during their decision-process correspond to the perception of the librarians.

## 4.2 Interviews with scientists

With the results of the second round of interviews, a first insight into the attitude towards OAP of scientists is gained. Furthermore, it enables a first assessment of whether the perceptions of librarians correspond to those of scientists. The labelling and eventual coding of the interviews again led to the identification of 8 final codes, shown in the Tables of appendix H. This section will discuss each of these codes, structured by the intra-organizational factors from the theoretical framework.

### 4.2.1 Description of OAP

In two fragments (see appendix H, Table 28), scientists described what OAP is to them by listing criteria an article or journal should comply to in order to be OA, for example as in this fragment:

*It's not only free access to those publications, but that you can reuse these as well.*

As this fragment shows, scientists identified free access to scientific research and reusability as criteria for OAP. As these criteria correspond to those identified by the librarians, it seems that the overall understanding of OAP among both librarians and scientists is clear.

### 4.2.2 Barrier for OAP

As in the analysis of the interviews with librarians, many fragments were coded with *'barrier for OAP'* as in these fragments, librarians described the barriers they experience to publish in OA. As Tables 25, 32 and 38 of appendix H show, the scientists agree upon the notion of the librarians that the current way of scientific evaluation makes scientists focus on impact factors and publishing in well-known journals because of concerns for their career prospects. Scientists criticise the scientific evaluation system and describe scientific evaluation as the cause for the scientists' focus on prestige and career advancements as follows:

*"The EU obliges you to publish in open access to receive their funding. However, in their decision who gets a subsidy is still based on the cv, publications and in which journals those publications have been published and therefore on the old fashioned impact factor."*

Hereby, the scientist refers to the hypocrisy of the current scientific evaluation system. As the scientists refers to the OA-policy of the EU, this fragment has been classified to organizational facilitators. Fragments concerning barriers for OAP classified to this intra-organizational factor are presented in Table 38 of appendix H.

The following fragment summarizes scientists' concerns with regard to the effect of publishing in OA on their career, with the addition that these factors are especially important to younger scientists:

*"I've noticed that young researchers think it's fine to publish in open access. However, they do wonder what effects open access publishing has on their career after their PhD program and therefore often think they should better publish in the high-impact journals after all."*

Since this fragment is about personal characteristics of a scientist, such as his/her age and career position, it is classified to the intra-organizational factor of personal characteristics (see Table 25 of appendix H). Interestingly, this fragment indicates that scientists sometimes actually wish to publish in OA, but nonetheless publish in non-OA journals simply because of their impact

factors and how this affects a scientist's career prospects, which is best explained by the following quote (see Table 38 of appendix H):

*"If you have the choice to publish in the non-open access Nature or the open access journal PLoS and you know that your paper is accepted by both, you obviously go for a publication in Nature."*

Additionally, monetary constraints (are mentioned to be a major barrier to publish in OA, reflected by the following, very concise quote:

*"Money poses a barrier."*

Hereby, the scientist refers to the requirement of paying an APC when publishing in OA, which increases the costs of publishing for a scientist. Again, this corresponds with the results of the interviews with librarians. Two other fragments that are classified to organizational facilitators discuss barriers for OAP that have to do with the university. First, a scientist mentions that the university leaves the decision to publish in OA up to the scientists' preferences:

*"It's not obligatory, so to publish in open access would really be something you do at your own incentive and motivation."*

This is coded as a barrier for OAP as it indicates that scientists are not actively stimulated or expected to publish in OA. Additionally, another scientist admits:

*"I don't know whether there is a mandate. I should actually know that."*

Especially this latter fragment is a striking result as it indicates the presence of a scientist's unawareness of the university's policy with regard to OAP, while the librarians mentioned to conduct several OA-activities to stimulate OAP which scientists apparently can probably miss out. Therefore, it is regarded as a barrier for OAP, as the scientist may not feel an urge to publish in OA when he does not perceive the university to implement an active OA-policy.

In the fragments that have been classified to social usage (see appendix H, Table 32), the scientists reflect on the differences in attitude with regard to OAP between the different academic discipline. For example, one scientist explains that within the discipline she works in (i.e. mathematics) it's already quite common to post pre-prints, but that this is most definitely not the case for other scientific disciplines:

"*I know that within the biology and science it's quite common to publish in a small and specific set of articles that are definitely not open access, which is taken for granted."*

Overall, the scientists thus identified the current scientific evaluation system, additional costs incurred by publishing in OA as major barriers for publishing in OA. Also, they acknowledged that the valuation for OAP differs greatly among the different disciplines.

### 4.2.3 Incentive for OAP

Fragments coded with *'incentive for OAP'* are classified under all three intra-organizational factors. The fragments classified to personal characteristics (appendix H, Table 26) once again reflect a scientist's focus on prestige and career advancements when considering whether or not

to publish in OA. However, instead of stressing the barriers caused by these factors, one scientist mentions a practical solution to solve this barrier and that could spur OAP:

*"It's up to the senior scientists to tell the younger scientists that it's about the quality of their research instead of the score of the journal the article is published in."*

Hereby, he agrees upon the notion of librarians that the scientific evaluation system should be changed. According to him, changing the scientific evaluation would spur OAP and can be achieved by focusing on the younger scientists while decreasing the influence that senior scientists have on their decision where to publish. The following fragment shows that scientists also realize that open access can benefit their career:

*"By publishing in open access you increase the chance for impact of your work and therefore, open access can be nothing but beneficial to your career."*

With regard to the discipline a scientist works in, therefore classified to social usage (and presented by Table 33 in appendix C) a clear incentive for OAP is described by the following fragment:

*"I think that there is quite a liberal attitude towards publishing within the discipline of mathematics. Authors are ranked in alphabetical order and there's not so much hassle about who gets to be the first author etc. Therefore, people are not so focused and stressed about where they should publish, which makes them probably more relaxed with regard to open access."*

This fragment stresses the differences in valuation of OAP that exist between the different academic disciplines, like the librarians described as well. Of course, whether the discipline provides an incentive or a barrier to publish in OA depends on these differences in the valuation of OAP. In this case, the way of working within the discipline serves as an incentive for OAP.

Asking about direct incentives for scientists to publish in OA, resulted in several fragments in which the scientist described organizational facilitators of OAP. These fragments are listed in Table 35 of appendix C. The following fragment provides a great overview of the reasons for scientists to decide to publish in OA:

*"Scientists publish in open access because of three reasons: first, because they have to in order to comply to the criteria of the grant provider. Second, because open access increases the research visibility. Third, because of ethical reasons."*

Another scientist added to this:

*"If journals such as Nature and Science decide to switch towards open access, there is no reason left for other journals not to enable open access."*

Hereby, he proposes a way to tackle one of the major challenges of OAP: the influence of traditional journals with high impact factors on scientists' decision where to publish.

### 4.2.4 Dissemination of information

Regarding the fragments in Table 30 and 36 of appendix H coded as *'dissemination of information'* and classified to social usage and organizational facilitators respectively, the

scientists point out that they have to look up information on their own incentive, for example through the Intranet, social media or by learning from the experience of their peers. Also, a need for a clear policy for the publishing process is formulated. As one scientist noted:

*"I don't want to look up the policy of each journal. This is something that should be facilitated"*

Hereby, he formulates a need for a clear publishing policy in general while stressing the fact that publishing in OA in general is fine for him, as long as he doesn't have to put a lot of effort into it. The fragments that are classified to organizational facilitators support this as in these fragments the scientists state to receive a lot of information, but do not have a clear overview of the general policy with regard to OAP. The following fragment is a great example for uncertainty among scientists with regard to this:

*"I would say that if the university or EU directs us towards open access, they would provide us with a list of journals, as we are already busy enough. If you'll have to look everything up by yourself, there are other things that have priority."*

Again, it's stressed that the lack of information about guidelines on how to publish in OA is withholding scientists from publishing in OA.

#### 4.2.5 Perception of OAP

The fragments coded with *'perception of OAP* have all been assigned to the intra-organizational factor personal characteristics since these fragments describe the personal perception of OAP of the interviewees. These fragments are presented in Table 27 in appendix C. As this table shows, in these fragments scientists describe why they regard OAP positively. It seems that the scientists hold a positive attitude because of an ethical point of view. For example, one scientist explains why he is a proponent of OAP as follows:

*"I want to reach as many people as possible with my research, even if these people cannot understand or interpret the results appropriately."*

Interesting about this fragment is that he refers to the argument used by opponents that opening up science to the public isn't always relevant or useful as science would be too hard to understand. While this was mentioned by a librarian as an important argument for scientists to be opposed to OAP, this is certainly not the case for this scientist.

On the contrary, there were also several scientists that explained to hold a distrustful attitude towards OAP. The distrustful attitude of these scientists is caused by the fear that OAP will turn out to be unsustainable in the long term, as mentioned by a scientist in the following:

*"I always have the fear that within a couple of years, it turns out to be unsustainable."*

A striking result is provided by the following fragment:

*"There are also librarians that question whether open access is indeed beneficial to science, or that it would lead to the publication of low-quality research."*

While librarians are assigned with the university's activities concerning OA and advocating OAP, this scientist has noticed that some librarians hold the fear that OAP will lead to a decreased quality level of science and will therefore not benefit science at all.

### 4.2.6 Academic disciplines

Obviously, the fragments that are labelled as '*academic disciplines'* (shown appendix H, Table 34) provide us with more insight into the way the interviewed scientists (who are working in different academic disciplines) describe their discipline. Important to note is that these fragments have been assigned the code 'academic discipline' and not as 'differences between academic disciplines', like was the case for fragments from the interviews with librarians. This is done because these fragments provide a description of the academic discipline the scientists work in, but not a description of differences with other disciplines. Besides telling in which discipline they work, scientists provided insight into how many authors are usually affiliated to an article, what the nature of the discipline is and whether OAP is already happening within the discipline or perhaps stimulated:

*"Within theoretical mathematics it's already common to post pre-print versions of your paper on a website."*

*"[...] no, on my own incentive. In the humanities, the pressure to publish in open access is not that strong."*

These fragments show that where the one scientist (working in the field of mathematics) describes OAP as something that is quite common already, another scientist (working in the field of Library& Information Sciences) acknowledges to publish in OA on his own incentive, as there is little pressure to do so in his discipline.

### 4.2.7 Submission decision

The following fragment (see Table 37 appendix H) is coded as '*submission decision',* since it describes the decision process of a scientist where to submit a paper:

*"I always discuss with my supervisor where to submit my articles"*

This fragment stresses the influence of a supervisor on a PhD-student once more. Furthermore, as Table 31 presents, the decision of where to publish is made by the leading author who first consults his colleagues about this decision. An interesting note is the following:

*"It's a combination. You're willing to pay for a great journal."*

This fragment once more stresses the fact that while scientist sometimes wish to publish in OA, it's still about balancing out their morals of opening up their research to the public and publishing in a prestigious journal when making the decision where to actually submit the paper.

### 4.2.8 Demographics

The fragments codes as *'demographics'* are all assigned to the intra-organizational factor personal characteristics, as within these fragments scientists simply describe their age and function at the university. As Table 29 in appendix H presents, the ages of the scientists range from 25 to 51 and the functions cover a PhD-student, a lecturer and two professors.

## 4.3 Preliminary results

Looking at the results of the two rounds of interviews, it seems that the librarians provided a quite accurate insight into the way scientists regard to OAP. For example, scientists indeed seem to perceive the focus on impact and the amount of citations during the scientific evaluation process as a hampering factor for publishing in OA. Also, the scientists acknowledged that these factors are in particular important to the younger scientists, as the librarians forecasted. However, several scientists did mention that publishing in OA can increase the research's visibility and citation rate, which are very important factors in the scientific evaluation system. Therefore, the scientific evaluation system can also be regarded to stimulate scientists to publish in OA, once scientists are aware of the advantages of publishing in OA. Furthermore, the fact that research grant providers increasingly demand scientists to publish in OA is identified as a great incentive. With regard to academic disciplines, the scientists confirmed that OAP is perceived differently by the different disciplines. Looking at the descriptions of OAP provided by scientists, the criteria for something to be OA correspond to those given by librarians and the factors influencing their decision where to submit a paper were indeed based on monetary constraints and balancing out their morals and monetary or career considerations.

However, there have been some contradictions between the visions of librarians and scientists discovered as well. At first, a scientist mentioned to be unaware of the OA-policy of his university, while the librarians claimed to focus on the creation of awareness. Furthermore, where a librarian mentioned that scientists not always perceive OAP as useful as scientific articles are too complex to understand for most people, one scientists literally counterfeited this argument by saying that the goal of OAP is to open up science, even though people will not always be able to interpret science as good as they should be.

A striking result was that one scientist mentioned that not all librarians are that supportive about OAP. Also, two scientists questioned whether OAP would actually benefit science as they believed that a system of OAP could also damage the system of scientific evaluation which is currently well-functioning, according to them. Hereby, it was questioned whether a system of OAP would benefit the sustainability of the scientific publication process.

The next section will discuss the results of the online survey. The analysis of these results will be guided by the abovementioned barriers and incentives that were identified from the rounds of interviews. The online survey enables to assess whether the factors librarians and scientists identified as barriers or incentives in the interviews are indeed perceived as barriers and incentives among scientists in the Netherlands at a larger scale.

## 4.4 Online survey among scientists

*This paragraph discusses the outcome and interpretation of the quantitative analysis, structured around the 12 hypotheses as construed in section 2.*

### 4.4.1 Descriptives

Among the respondents, the age varied between 22 and 72 years with an average age of 39,5 years. Furthermore, 121 of the 192 respondents indicated to prefer publishing in OA over publishing in a subscription-based journal. When looking at the distributions of the data, the dependent variable of a scientist's attitude towards OAP does not follow a normal distribution. Hence, non-parametric tests are used for the data-analysis in this research. The data is checked for multi-collinearity (or singularity) as such correlations could be problematic because it hampers the determination of the unique contribution of each variable (Field, 2013). To ensure there is no multi-collinearity present among the variables, the determinant of the factor analysis cannot be lower than 0,00001. Additionally, the inter-variable correlations cannot be higher than 0,8. As presented by table 15 in appendix D, none of the inter-variable correlation exceed the limit of 0,8 and the determinant of the factor analysis is 0,009. Therefore, it is ensured that there is no presence of multi-collinearity in the data.

### 4.4.2 Analysis

All statistical results are presented in appendices C, D, E and F. Before discussing each hypothesis one by one, table 4 provides an overview of the outcome of the online survey. This table shows that 10 significant relations between a variable and the scientist's attitude towards OAP were found and that there have been 6 factors identified as incentive for OAP (indicated by a '+') and 3 factors identified as a barrier (indicated by a '-').

*Table 3. Overview of the outcome of the online survey*

| Hypothesis | Variable | Effect on attitude towards OAP ( based on the online survey) | Outcome Hypothesis |
|---|---|---|---|
| 1 | Age | - | Accepted |
| 2 | Career position | - | Rejected |
| 3 | % OA-publications vs. % non-OA publications | - | Accepted |
| 4a | Personal perceived usefulness | + | Accepted |
| 4b | Societal perceived usefulness | + | Accepted |
| 5 | Perceived ease of use | + | Accepted |
| 6 | Number of authors affiliated to an article | | Insignificant |
| 7 | Discipline | | Insignificant |
| 8 | Mono-disciplinarity of discipline | - | Accepted |
| 9 | Peer usage of OAP | + | Accepted |
| 10 | Presence of OA-expert | | Insignificant |
| 11 | Presence of OA-information sessions | + | Accepted |
| 12 | Strictness of university's OA-policy[5] | | Insignificant |
| 13 | Valuation of OAP within discipline | + | Accepted |

Firstly, as Table 15 in appendix D indicates, there is a negative ρ-correlation of -0,187 (with a p-value of 0,09) between ***age*** and the attitude towards OAP. This indicates that when the age of a scientist increase, the likelihood for holding a positive attitude towards OAP decreases. Or, to phrase this in line with hypothesis 1: the younger a scientist is, the more likely it is he holds a positive attitude towards OAP. Therefore, hypothesis 1 is carefully confirmed (i.e. for $\alpha$=0,10).

[5] The strictness of the OA-policy of a university was measured by assessing the presence of funding for OA-publications, technical support and a clear OA-policy

Assessing the influence of ***a scientist's career progress*** on his/her attitude towards OAP results in a negative ρ-correlation of -0,129 with a p-value of 0,075, as shown in Table 15 of appendix D. Contrary to what was hypothesized, it seems that the more progressed a scientist is in his scientific career, the less likely it is he holds a positive attitude towards open access. As the correlation is significant for $\alpha$=0,10, hypothesis 2 is therefore carefully rejected. Examining the correlation between the two independent variables of a scientist's age and his/her career position, results in a Spearman ρ-correlation of 0,697. Hence, as in general one's career position increases while ageing, the findings of H1 and H2 are complementary to each other and outweigh the theoretical presumption that once a scientist's career is yet established, the openness to new publishing sources increases.

To test for hypothesis 3, a Spearman ρ-correlation was calculated. As shown in Table 15 of appendix D, this resulted in a negative correlation of -0,197 (with a p-value of 0,017) for ***the percentage of subscription-based articles*** with a scientist's attitude towards OAP. Therefore, hypothesis 3 is accepted. Based on this finding, it's concluded that the more articles a scientist has published in subscription-based journals compared to his publications in OA, the less likely it is he has a positive attitude towards OAP.

The results show that the more a ***scientist perceives OAP as useful to his/her career***, the more likely he is to hold a positive attitude towards OAP as the influence of the personal perceived usefulness of OA of a scientist on his/her attitude towards OAP showed to have a positive ρ-correlation of 0,432 with a p-value of 0,000 (see Table 15 in appendix D). Therefore, hypothesis 4a is accepted and it's concluded that the more a scientist perceives OA as useful to his/her career, the more likely he is to hold a positive attitude towards OAP. As the ρ-correlation between the ***perceived societal usefulness of OAP*** and a scientist's attitude towards OAP is 0,619 with a p-value of 0,000 (see Table 15 in appendix D), hypothesis 4b is accepted as well. Based on this result, it's concluded that the more a scientist perceives OA as useful to society, the more likely he is to hold a positive attitude towards OAP.

This research also examined whether ***a scientist's perceived ease of use (PEU***) of OAP influences his attitude towards OAP. As indicated by Table 15 in appendix D, the ρ-correlation between PEU and a scientist's attitude is 0,217 With a p-value of 0,002. This positive correlation shows that the more a scientist perceives OAP as easy to use, the more likely he is to hold a positive attitude towards OAP. Therefore, hypothesis 5 is accepted.

To test for hypothesis 6, the ρ-correlation between the amount of authors affiliated to an article and the academic discipline a scientist works in is calculated first. As shown in Table 15 of appendix D, this ρ-correlation is only -0,088. This result shows there is no significant interaction between these two independent variables. Subsequently, the ρ-correlation between ***the amount of authors that are usually affiliated to an article*** and a scientist's attitude towards the innovation of OAP was calculated and turned out to be 0,093 with a p-value of 0,199 (see Table 15 in appendix D). Therefore, hypothesis 6 can neither be accepted nor be rejected.

Appendix E shows the results of the analyses to test for the influence of ***the discipline a scientist works*** on his attitude towards OAP. As a Kruskal Wallis analysis assumes equal distribution, first a non-parametric Levine's test was performed. The results of the Levine's test (presented in Table 16) showed no significant differences between the groups, justifying the use of a Kruskal Wallis analysis. However, as Table 17 shows, the $\chi^2$-value of 4,831had a p-value of 0,305. Therefore, the results are insignificant and hypothesis 7 can neither be accepted nor be rejected.

To test for the influence of the ***mono-disciplinarity*** of a scientist's discipline on his/her attitude towards OAP, again a Kruskal Wallis analysis has been performed. As Tables 18-22 in appendix F show, there were no significant differences identified between mono- and interdisciplinary fields and the attitude towards OAP, nor between inter- and multi-disciplinary fields and the attitude towards OAP. Furthermore, they show a $\chi^2$-value for the difference between mono- and multi-disciplinary fields of 3,989 with a p-value of 0,046. Therefore, it can be argued that scientists in multi-disciplinary fields have a more positive attitude towards OAP than scientists of mono-disciplinary fields. This indicates that hypothesis 8 can be accepted. So, it is indeed the case that research conducted in a mono-disciplinary field is less likely to be published in OA than research conducted in a multi-disciplinary field.

For the influence of ***peers publishing in OA*** on a scientist's attitude towards OAP, a Spearman $\rho$-correlation was calculated. As Table 15 of appendix D shows, this resulted in a significant and positive $\rho$-correlation of 0,260 with a p-value of 0,001. Therefore, based on this results it is concluded that the more peers publish in OA, the more likely it is for a scientist to have a positive attitude towards OAP. Hypothesis 9 is accepted.

To test for the influence of the ***presence of an OA-expert*** on the attitude towards OAP of a scientist, a Mann Whitney analysis was performed. First, the respondents that didn't know whether there is or isn't an OA-expert present were excluded from the results. Subsequently, a control test was performed to test for equal distributions. Because the variances showed no significant differences the use of this analysis was justified. However, as the results in Table 23 in appendix G show, the U-value for this test is 655,5 with a p-value of 0,514. Therefore, hypothesis 10 cannot be accepted nor be rejected.

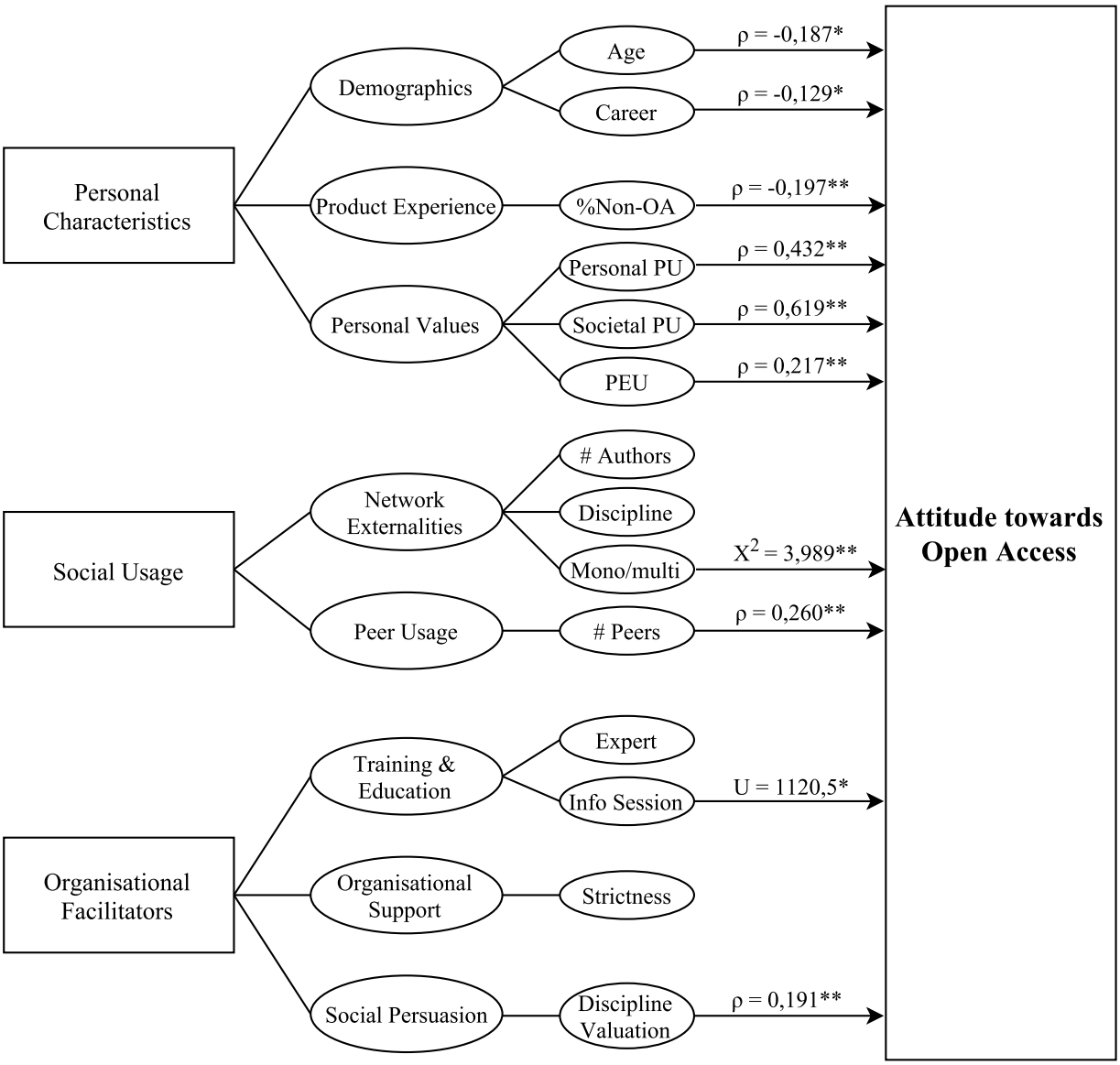
To test for hypothesis 11, again a Mann Whitney analysis was performed. Again, first a control test for equal distribution was performed. Because the variances did not show any significant differences, the analysis was continued. The test results in Table 24 of appendix G present a U-value of 1120,5 with an p-value of 0,064 the ***presence of OA-information sessions***. Therefore, it seems that the presence of OA-information sessions indeed positively influences the attitude towards OAP and hypothesis 11 is accepted.

To test for the influence of a ***university's OA-policy*** on the scientists' attitudes towards OAP, one last Spearman correlation is calculated. As Table 15 of appendix D shows, this correlation of -0,058 has a p-value is 0,460. Hypothesis 12 can therefore neither be confirmed nor rejected.

The discipline a scientist works in, showed to have no significant Spearman $\rho$-correlation with the scientist's attitude towards OAP. However, when analysing the influence of the ***valuation for open access within the discipline*** a scientist works in on his/her attitude towards open access, a positive Spearman $\rho$-correlation of 0,191 was found with p-value=0,026 (See Table 15 in appendix D). Therefore, hypothesis 13 is accepted. Hence, while it is unknown whether the discipline a scientist works in influences his attitude towards OAP, these results show that the degree to which OAP is valued in the discipline does positively influence a scientist's attitude towards OAP.

## 4.5 Summary of the results

Based on the interviews and data collected through the survey, ten factors that play an important role in the adoption-decision process with regard to OAP of scientists have been identified. These factors are visualized in Figure 6 with an arrow above which the statistic relation between the factor and the attitude towards OAP is indicated.




* p<0,10, **p<0,05

*Figure 6. Barriers and incentives for OAP*

# 5. Discussion & Limitations

*This research focused on a scientist's adoption-decision with regard to OAP and identified the factors scientists employed by Dutch universities perceive as incentive or barrier in their adoption-decision process for OAP. In doing so, this research complemented the range of factors influencing a scientist's decision whether or not to adopt OAP. This section discusses the implications of these findings, what future research could focus on and the limitations of this research.*

## 5.1 Implications

The scientist's personal characteristics along with the characteristics of the scientific discipline he works in showed to be of great importance during the scientist's adoption-decision process. First, the results confirmed the hypothesis that younger scientists are more likely to hold a positive attitude towards OAP (as long as they are not directed towards non-OA journals by their supervisors). In line with this finding, the alternative hypothesis that scientists in a more advanced career position are more likely to hold a positive attitude towards OAP was rejected based on the test results. This showed that the age – and derived openness to new ways of publishing – of a scientist is of greater influence on the attitude towards OAP than his/her career position. Subsequently, it was concluded that the percentage of subscription-based articles of a scientist's total research output indeed negatively influences a scientist's attitude towards OAP. These findings indicate that the decision whether or not to publish in OA might be guided by a routinized way of working because organizations – and the actors involved – 'remember by doing' (Nelson & Winter, 1982). As a result, a lock-in with regard to the way and the journals scientists publish in arises. This finding is in accordance with the previous finding of Schimmer et al (2015) that most scientists favour to submit their work to subscription-based journals they are already familiar with instead of to new OA-journals (Schimmer et al,2015). Hence, the faster scientists are persuaded to make the transition towards publishing in OA, the faster a system of full OA can be accomplished. Following this line of argumentation, it is advised to implement the recommendations as soon as possible.

Furthermore, the results confirmed Mann et al.'s (2009) finding that the more a scientist perceives OA as useful to his/her career, the more likely he/she is to hold a positive attitude towards OAP. In addition to these findings the results showed that a scientist's perceived ease of use influences his/her attitude towards OAP positively as well. Therefore, besides communicating policy goals of reaching a transition towards a system of full OAP in the next few years, the Dutch government should enact a clear programme that outlines the benefits of a system of full OAP. In doing so, the focus should be on facilitating systems of publishing in OA in a transparent and comprehensible fashion.

Next, when examining the influence of the amount of authors affiliated to an article and a scientist's attitude towards OAP, no significant correlation was found. With the information gained during the interviews, this result seems very logical. Scientists mentioned that for articles with a lot of authors it is often the case that only a few of the names actually wrote the paper and others made only a small contribution to the research by providing a photo, for example. Also, to affiliate an author to an article could be based on strategic reasons. For example, the scientists could be a pioneer in his field and by mentioning him in the author's list would increase the impact of the research. Further research could look into these strategic reasons of naming a scientist as author of an article.

When looking at the influence of the discipline in which a scientist works in on his/her attitude towards OAP, no significant correlation was found. However, the degree of monodisciplinarity

of the discipline was found to influence a scientist's attitude towards OAP. Similar to publishing in OA journals, research collaborations have proven to increase the research productivity, visibility and efficiency. That is, these papers are cited more frequently and are more easily disseminated, which improves the research visibility throughout multiple disciplines (Hajjem et al., 2006; Bjork, 2004). As multi-disciplinary research aims for a dissemination as wide as possible (Jons, 2007), it can be argued that the advantage of an increased research visibility when publishing in OA is of higher importance to scientists in multi-disciplinary scientific disciplines compared to scientists in mono-disciplinary disciplines. Following a similar line of argumentation, the same could apply to relatively young (compared to established) disciplines. Namely, impact factors accumulate over time. Therefore, scientists in young disciplines arguably look for other decision factors, like research visibility – which is a key advantage of OAP. Hence, further research could look into the question whether young disciplines are indeed a better environment for OAP in comparison than the traditional disciplines.

Furthermore, the results pointed out that once a scientist's peers publish in OA, it becomes more likely that he/she holds a positive attitude towards publishing in OA as well. This finding was once more stressed by the result that the valuation of OAP within the scientific discipline in which a scientist works, influences his/her attitude towards OAP. Hereby, this research indicates that publishing in OA is a very social activity. This knowledge can be used when looking for ways to create awareness on the topic of and disseminate information about OAP, as it seems that scientists are most easily persuaded to publish in OA by their peers. The findings that the presence of an OA-expert within the university a scientist works for doesn't influence his/her attitude towards OAP, but the presence of information sessions about OAP does, supports this thought.

While all VSNU-universities mentioned to be actively involved with OAP, the existence and strictness of an OA-policy within the university a scientist works did not show a significant relation with a scientist's attitude towards OAP. This can be explained by the fact that while several universities implemented an OA-policy already, regulations that oblige scientists to publish in OA are set for 2020 or even 2024. This implicates that building and maintaining a strict policy in this early phase can be a complex process. After all, it is about a transition.

In sum, the personal characteristics of a scientist (i.e. personal and societal perceived usefulness of OAP, the PEU of OAP, age, career position, the experience of OA-publications compared to non-OA publications) and the characteristics of the scientific discipline a scientists works in and the university he/she is employed by (i.e. peer usage, valuation of OAP in the scientific discipline, the presence of OA-information sessions and the degree of mono-disciplinary of the discipline) are important to a scientist in forming an attitude towards OAP.

Since this research showed that publishing in OA is a social occasion, it is plausible that the adoption process of OAP will follow a snowball-effect. It is the role of the Dutch government to guide and stimulate this process as good as possible. For this aim, it should be made clear what the benefits of publishing in OA are to society, science and the scientist. Also, the process of publishing in OA should be made as easy as possible to the scientist. Lastly, building reputation for the OA-journals by supporting scientists to publish in OA (e.g. by rewarding scientists for publishing in OA) could induce a network effect as once more people publish in OA, the reputation of these journals increases and therefore more people will want to publish in those OA-journals. In conclusion, the transition towards OAP is about changing the publishing-behaviour of scientists. However, human behaviour in general is arranged in such a way that makes humans resistant to change (McGregor, 1960). This research identified factors

influencing a scientist's attitude towards OAP. Focusing on these factors offers the opportunity to organize a system of OAP in such a way that it is accepted by scientists - therewith facilitating the transition towards a system of full open access to scientific publications.

## 5.2 Limitations & Future Research

Like every other study, this research is subject to some limitations. First, it should be noted that the online survey had a response of 233 individual scientists. With the population of scientists in the Netherlands counting approximately 25.000 people and a precision level of 5%, an appropriate sample size for this research would count 394 scientists (Israel, 1992). The sample size for the online survey was thus relatively small. However, the distributions of the respondents' functions at the university and gender showed great resemblance with the population. Therefore, the sample was nonetheless used for this research. Further research could aim to increase the sample size. This could be achieved by cooperating with the universities more closely, so that more universities spread the request to their scientists like the University of Tilburg did for this research. By this means, a more equal distribution of the universities the respondents are employed by could be acquired. As most universities has a specific disciplinary focus, this would result in a more even distribution of the disciplines the respondents work in. Also, further research could reach out to publishing houses with the request to spread the online survey among the scientists within their community.

Secondly, one should be aware of the possible presence of a bias in the sample. It seems likely that scientists that are in favour of OAP, or at least aware of the concept, are more likely to have taken the time to fill in the questionnaire than those opposed to or unaware of the existence of OAP. As it was simply not possible to maintain an even distribution of OA-supporters vs. OA-opponents in the sample, measures were taken to minimize the possible bias. First, the scientists with whom an interview was conducted were selected on the basis of their ages, functions, scientific disciplines and attitudes towards OAP to assure as much diversity among the interviewees as possible. Second, besides posting the request to fill in the online survey on OA-focused media channels like the website www.openaccess.nl, it was disseminated through 'OA-neutral' channels as well. The request was included in the newsletters of SURFmarket and SURFspot, that inform employees of research institutions about news on science and research in general. Furthermore, librarians and scientists were asked to share the URL to the online survey with their peers. For example, the Tilburg University included the request in its faculty newsletters. Hereby, those who do not visit the website www.openaccess.nl or follow the hashtags 'openaccess' and 'openscience' on social media were addressed as well. As suggested above, further research could involve the universities and publishing houses more actively in the dissemination of the request to fill in to the online survey. By doing so, a bias with regard to the awareness and/or attitude towards OAP among the respondents would be further reduced.

# 6. Conclusion

The aim of this research was to identify factors that scientists perceive as barrier or incentive during their decision to publish in OA. The interviews with librarians provided a general overview of the OA-policy of the VSNU universities. The interviews with scientists provided a first insight into factors perceived as barrier or incentive during the adoption-decision process regarding OAP. The online survey tested for these factors for a larger group of scientists. Based on the interviews and data collected through the survey, ten factors that play an important role in the adoption-decision process with regard to OAP of scientists have been identified.

Looking at the intra-organizational factor of personal characteristics, the **age** of a scientist is identified as a barrier for OAP as it negatively influences a scientist's attitude towards OAP: older scientists are less likely to hold a positive attitude towards OAP than their younger peers. A second barrier is the **career position** of a scientist as the results have shown that the higher position a scientist has, the less likely it becomes that he/she holds a positive attitude towards OAP. Another barrier is identified in the intra-organizational factor of social usage. Where the scientific discipline itself did not show to have a significant influence on a scientist's attitude towards OAP, **a mono-disciplinary nature of the discipline** showed a negative correlation with the scientist's attitude towards OAP and is therefore regarded as a barrier.

Besides these barriers, incentives have been identified in the intra-organizational factor of personal characteristics as well. The results pointed out that once OAP is perceived as useful to a scientist's career, to society or as easy to use, the scientists is more likely to pursue a publication in OA. Therefore, the **personal** and **societal perceived usefulness** and the **perceived ease of use** of OAP are identified as incentives for OAP. Additionally, looking at the last intra-organizational factor: organizational facilitators, the amount of **peer usage** and the **valuation of OAP in the discipline are** identified as incentives for OAP as scientists are more likely to publish in OA when their peers do so and/or value OAP. Furthermore, the **presence of information sessions about OAP** at a university increases the likelihood that a scientist holds a positive attitude towards OAP and is therefore regarded as an incentive as well.

# 7. MANAGERIAL & POLICY ADVICE

*This section discusses what the results implicate for SURFmarket at a managerial level and provides policy advice.*

Firstly, the results of the online survey showed that once publishing in OA is perceived as easy to do, a scientist is more likely to actually pursue publishing in OA. Providing a clear overview of the OA publishing process takes away the barrier for scientists of having to look up all different publishing protocols of different journals. Therefore, providing an overview is expected to increase the perceived ease of use. As the results show, scientists regard information sessions at universities as a useful way to disseminate information. The UKB and VSNU could initiate such sessions and use these to provide their scientists with as much and as detailed information as possible. SURFmarket has knowledge about the practical barriers as experienced by university libraries (and their scientists) and the negotiations with scientific publishers. SURFmarket could therefore take up a coordinating role by providing information for and at these meetings, or online. Communicating the knowledge about the scientists and libraries to the publishers and vice versa would provide much clarity. Above all, SURFmarket is an ICT-intermediary for educational institutions in the Netherlands. Therefore, it is advised to perform further analysis what services could be developed that would ease the process of OA publishing for scientists.

Secondly, both the results of the interviews and the online survey showed that young scientists are more likely to hold a positive attitude towards publishing in OA than their older peers. Nonetheless, young scientists are often guided to publish in traditional, non-OA journals by their supervisor. The enactment of new OA-policies could implement measures to tackle this issue. For example, policies that impede PhD-supervisors to force their PhD-candidates to publish in non-OA journals would be very useful. Ideally, the OA-policies would be organized in such a way that supervisors guide and stimulate their PhD-candidates towards OAP. This is clearly a policy matter. SURFmarket could take up a role in identifying and communicating issues that need to be tackled at a policy level.

Lastly, scientists from Multi-disciplinary disciplines turned out to value publishing in OA more than mono-disciplinary fields. Also, scientists turned out to be more likely to publish in OA when it is appreciated within their discipline. Therefore, the advice is to address the efforts to stimulate OAP at first to young scientists working in multi-disciplinary disciplines. Once these scientists have accepted the use of OAP, they could be assigned as 'ambassadors for OAP' in order to make OAP accepted in other fields as well. The project Cream of Science implemented by Dutch Universities in 2005 could serve as an example case, as this project made use of OAP ambassadors as well. With the aim to make the scientific output of all Dutch scientific organizations available, leading Dutch scholars were selected and approached by the Dutch universities with the request to deposit their publications in the academic archive or institutional repository. Eventually, 150 leading Dutch scholars contributed to the project by depositing their research results. These research results served as an overview of the academic output of leading Dutch scholars (Mettrop, 2006). The VSNU and UKB could approach young scientists from multi-disciplinary disciplines at first and ask them to publish in OA and advocate for OAP. Again, SURFmarket can take up a signalling and informing role.

In conclusion, SURFmarket could take up the role of a signaller of issues concerned with OAP and a facilitator of OAP by developing services that would ease the process of publishing in OA.

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# APPENDIX A- THE SUBJECT AREAS AND THEIR DISCIPLINES

*Table 4. Aggregation of scientific disciplines*

| Life Sciences | Health Sciences | Physical Sciences | Social Sciences & Humanities |
|---|---|---|---|
| Agricultural and biological sciences | Medicine | Chemical engineering | Arts and humanities |
| Biochemistry, genetics and molecular Biology | Nursing | Chemistry | Business, management and accounting |
| Immunology and microbiology | Veterinary | Computer science | Decisions, sciences |
| Neuroscience | Dentistry | Earth and planetary sciences | Economics, econometrics and finance |
| Pharmacology, toxicology and pharmaceutics | Health professions | Energy | Psychology |
| Multidisciplinary | Multidisciplinary | Engineering | Social sciences |
| | | Environmental science | Multidisciplinary |
| | | Materials science | |
| | | Mathematics | |
| | | Physics and astronomy | |
| | | Multidisciplinary | |

# APPENDIX B- SURVEY QUESTIONS

Personal Characteristics

**1. What is your age?**

Open box to fill in the age in numbers

**2. What is your gender?**

a) Female
b) Male

3. **By which institution are you employed?**

*Dropdown menu with option for each VSNU-member university and 'other…'*

If 'other' is selected, the question *"You have selected 'other'. By which institution are you employed?"* appears.

**4. What is your title/function at the university?**

a. Lecturer
b. Junior Scientist
c. PhD Candidate
d. (postdoctoral) Scientist
e. Assistant professor
f. Associate professor
g. Full Professor
h. Professor by special appointment
i. Professor with administrative duties
j. Other: ... *(open box to fill in the function)*

**5. How long have you been working as an academic scientist?**

*Open Box to fill in the amount of time*

**6. "I would like to try out new ways of publishing"**

*Scale answer from totally disagree until totally agree*

*7.* **Have you published a scientific article in a journal with an impact factor before?**

**a)** Yes
**b)** No

IF *answer is* YES:

**7A: You have indicated that you have published a scientific article before. How many articles have you published in total?**

*Open Box to fill in the amount of articles*

**7B: You have indicated that you have published a scientific article before. How many of your publications have been published in OA?**

*Open space to fill in the amount of publications*

**8. Are you planning to publish a scientific article?**

a. Yes
b. No

IF YES:

**8A: Are you planning to publish in OA?**

a) Yes
b) No
c) Haven't thought about it yet

d) I don't know what OA is

**8B: How many articles are you currently working on?**
*Open space to fill in in the amount of articles*

**8. Which statement applies to you?**
a) "I prefer to publish in an OA journal"
b) "I prefer to publish in a subscription-based journal"
c) "I do not care whether the journal I publish in is OA or subscription-based"

**8B** IF ANSWER ON 3 IS 'I prefer to publish in an OA journal' OR 'I prefer to publish in a subscription-based journal', the question "**Could you elaborate on why you prefer this type of publishing?" appears.**
*Open space to provide commentary*

IF ANSWER ON 8 IS 'I do not care whether the journal I publish in is OA or subscription-based', the question **"Could you elaborate on why you do not have a preference for a certain type of publishing?" appears.**
*Open space to provide commentary*

1. **"OAP is useful for my career"**
   *Likert scale that ranges from totally disagree until totally agree*

2. **"OAP hampers the progress of my career"**
   *Likert scale that ranges from totally disagree until totally agree*

3. **"OAP is useful for society"**
   *Likert scale that ranges from totally disagree until totally agree*

4. **"OAP is easy to do."**
   *Likert scale that ranges from totally disagree until totally agree*

5. **"Overall, I am in favour of OAP"**
   *Likert scale that ranges from totally disagree until totally agree*

<u>Social Usage</u>

1. **In which discipline do you work?**
   a. Humanities
   b. Social Sciences
   c. Life Sciences
   d. Health Sciences
   e. Physical Sciences

2. **How many authors are usually affiliated with your articles?**
   a. 1-3
   b. 3-5
   c. 5-7
   d. 7-10
   e. >10

3. **Complete the following sentence: "In my discipline, most research is…"**
   a. Mono-disciplinary
   b. Multidisciplinary
   c. Interdisciplinary

4. **Complete the following sentence: "publishing in an open-access journal in my discipline is..."**
    a. Common
    b. Occasional
    c. Unusual
    d. I do not know

5. **Have you recently read an article within your discipline that was published in OA?**
    a) Yes
    b) No
    c) I do not know

Organizational Facilitators

1. **How do people within your discipline regard to publications in an open access-journal?**
    a. Publications in an open access journal are appreciated
    b. Publications published in an open access or subscription-based journal are equaly appreciated.
    c. Publications in an open access journal are not appreciated
    d. I do not know

2. **Does the university you are employed by stimulate you to publish in OA?**
    a. Yes
    b. No
    c. I do not know

*Optional: If you wish to elaborate on this question, you can write down your commentary here.*

3. **Does the university you are employed by discourage you to publish in OA?**
    a. Yes
    b. No
    c. I do not know

*Optional: If you wish to elaborate on this question, you can write down your commentary here.*

4. **Is there someone available for questions who is specialized on OA publishing, within the university you are employed by?**
    a. Yes
    b. No
    c. I do not know

5. **Does the university you are employed by organize information sessions on OAP?**
    a. Yes
    b. No
    c. I do not know

4B If question 4 is answered with 'Yes', the following question appears: **Complete the following sentence: "when the university I am employed by organizes information sessions on OAP..."**
    a. I usually attend these days
    b. I do not attend these days

If question 4 is answered with 'No', the following question appears: **Which statement applies most to you?**
    a) "I wish there would be such days"
    b) "I think there is no need for such days"
    c) I do not know

6. **Does the university you are employed by have a policy on OAP?**
    a. Yes
    b. Yes, but there is no control
    c. Yes, and there is a strict control
    d. I do not know

7. **Does the university you are employed by have an OA fund?**
    a. Yes
    b. No
    c. I do not know

6B: If question 6 is answered with 'Yes', the question **"Have you used this fund?"** appears.
    **a)** Yes
    **b)** No

*Optional to leave commentary*

8. **Does the university you are employed by provide support in registering your OA publications?**
    a) Yes
    b) No
    c) I do not know

9. **Do you receive funding for publication in general?**
    a. Yes
    b. No
    c. Sometimes

10. **Are you required to publish in OA, if you receive funding for your publication?**
    a. Yes
    b. No
    c. I do not know
    d. It depends on the funding agency

# APPENDIX C- CODING SCHEMES INTERVIEWS WITH LIBRARIANS

## *Personal Characteristics*

*Table 5. Example fragments with code 'perception of OAP' in 'personal characteristics'*

| Library | Fragment | Intr. Org. Factor | Label | Code |
|---|---|---|---|---|
| ***UvA (AMC)*** | *"I question what the added value for society is by making articles OAP as a lot of research is too technical or complex for the normal reader and specialised researchers already have access to the information they need."* | Personal characteristics | Added value of open access | Perception of OAP |
| **VU** | *I am a supporter of open access publishing for the full 100%."* | Personal characteristics | Positive attitude | Perception of OAP |
| **UU (UBU)** | *I am a fierce proponent of open access* | Personal characteristics | Positive attitude | Perception of OAP |
| **Maastricht University** | *My attitude with regard to open access is neutral as I do not think it is always relevant* | Personal characteristics | Neutral attitude | Perception of OAP |
| **TU Delft** | *we are open access advocates* | Personal characteristics | Positive attitude | Perception of OAP |
| **Leiden university (Walaeus)** | *I am both a supporter and an opponent of open access publishing […] I am a supporter of the green road and a criticizer of the golden road to open access publishing."* | Personal characteristics | Mixed attitude | Perception of OAP |
| **Wageningen UR** | *I am a careful supporter of open access. Hereby I mean that open access delivers both advantages as disadvantages to scientists* | Personal characteristics | Mixed/neutral attitude | Perception of OAP |
| **UU (UBU)** | *Although I think it is wrong to focus on impact factor, I think it's very logical for young scientist to do so. After all, their career depends on their evaluation* | Personal characteristics | Young scientists | Perception of OAP |
| **Radboud RU** | *instruct the younger layer of scientists how they can change the traditional model, to enthuse them for open access and importantly, to decrease the impact the older layer of scientists have on the decision where to publish for the younger scientists* | Personal characteristics | Enthusing young scientists | Perception of OAP |
| **UU (UBU)** | *I think that the way we currently disseminate scientific information is unsustainable for the long term. The growth of the worldwide scientific output makes it impossible to keep offering scientific articles according to a subscription model."* | Personal characteristics | Open access as sustainable solution | Perception of OAP |
| **UU (UBU)** | *It would be very hypocrite to demand access to all scientific information, but to publish in a non-open access journal yourself."* | Personal characteristics | Open access as ideal | Perception of OAP |
| **Leiden University (Walaeus)** | *"Open access will increase the costs for us: the writing and publishing institutions."* | Personal characteristics | Distrust for open access: Costs | Perception of OAP |
| **Leiden University (Walaeus)** | *"In my opinion, open access publishing isn't that different or renewing for science, but rather a political sentiment. After all, once an article is published in open access, it is published and read by the same research group and only the payment changes."* | Personal characteristics | Distrust for open access: Usefulness | Perception of OAP |
| **Maastricht University** | *However, it is very hard to attain these scientists […] You have to allude to their self-interest, which is to publish in a high-ranked journal as this would benefit their CV and professional future the most"* | Personal characteristics | Scientists' preference for high ranked journals | Perception of OAP |
| ***VU*** | *OA is about making scientific output as widely available as possible.* | Personal characteristics | OA to disseminate scientific output | Perception of OAP |

| | | | | |
|---|---|---|---|---|
| ***VU*** | *OA is a way to disseminate scientific knowledge, but moreover to accelerate scientific processes."* | Personal characteristics | OA to disseminate and accelerate scientific output | Perception of OAP |
| ***UU (UBU)*** | *OA is worldwide free access to scientific information, within no time limit and therefore forever* | Personal characteristics | OA to disseminate scientific output without limitations | Perception of OAP |
| ***Leiden University*** | *We aim to advance science. To me, OA is a way to accomplish that* | Personal characteristics | OA to advance science | Perception of OAP |

*Table 6. Example fragments with code 'incentive for OAP' in 'personal characteristics'*

| Library | Fragment | Intr. Org. Factor | Label | Code |
|---|---|---|---|---|
| **UU (UBU)** | *"Furthermore, the attitude with regard to open access is formed by the knowledge about open access publishing someone has and/or what someone hears from peers and reads in newspapers, for example."* | Personal characteristics | Incentive: Peer usage | Incentive for OAP |
| **UU (UBU)** | *what I hear the most, especially from scientists that have published in open access before, is that publishing in open access increases the visibility of an article. An increased visibility is important to scientists as their research is used more, but moreover because their evaluation is partially based on how many times their articles have been cited.* | Personal characteristics | Incentive: Open access increases visibility | Incentive for OAP |
| **UU (UBU)** | *Once someone has taken the step to publish in open access, publishing in open access a second time is more likely."* | Personal characteristics | Incentive: repetitive behaviour | Incentive for OAP |
| **Maastricht University** | *As a consumer, I would be in favour of open access as it is a nice idea that people that normally can't afford the subscription fees can access scientific information freely."* | Personal characteristics | Incentive: making science available to everyone | Incentive for OAP |
| **TU Delft** | *I even expect open access journals to overtake the impact factor in comparison with subscription-based journals* | Personal characteristics | Incentive: Open access prospective | Incentive for OAP |
| **Tilburg University** | *the main argument for scientists to be supporter of open access publishing is that anyone should be able to access scientific literature without any limitations* | Personal characteristics | Incentive: Opening up science to everyone | Incentive for OAP |
| **KNAW** | *A reason for scientist to support open access publishing is that it increases the visibility of their research."* | Personal characteristics | Incentive: Open access increases visibility | Incentive for OAP |
| **TU Twente** | *I am clearly a supporter of open access* | Personal characteristics | Positive attitude | Incentive for OAP |
| **Wageningen UR** | *The most important advantages OA publishing offers are that it increases the visibility and the amount of citations of your research."* | Personal characteristics | Incentive: increased visibility and citations | Incentive for OAP |
| **RUG** | *it is a great idea that when you want to read about a certain topic, you have access to all scientific information available for the topic.* | Personal characteristics | Incentive: Opening up science to everyone | Incentive for OAP |

*Table 7. Example fragments with code 'Description of OAP' in 'personal characteristics'*

| Library | Fragment | Intr. Org. Factor | Label | Code |
|---|---|---|---|---|
| ***UvA (AMC)*** | *Also, it should be accessible and findable via google* | Personal characteristics | Access through internet as | Description of OAP |

| | | | | |
|---|---|---|---|---|
| | | | criterion for OA | |
| ***VU*** | *Also, the output should be reusable.* | Personal characteristics | Reusability as criterion for OA | Description of OAP |
| ***Maastricht University*** | *Having worldwide access to scientific publications through the internet beyond the information that is available within the university library."* | Personal characteristics | Worldwide access as criterion for OA | Description of OAP |
| ***Erasmus University*** | *OA is freely accessible scientific information* | Personal characteristics | Free access as criterion for OA | Description of OAP |
| ***Radboud University*** | *OA is the movement that is trying to make scientific literature freely available to anyone* | Personal characteristics | OA as a movement to make scientific output free | Description of OAP |
| ***Leiden University (Walaeus*** | *I would define it as a financial transition for scientific journals and articles. "* | Personal characteristics | OA as a financial transition | Description of OAP |
| ***Wageningen UR*** | *"Also, OA is a business model".* | Personal characteristics | OA as a business model | Description of OAP |

## Social Usage

*Table 8. Example fragments with code 'Barrier for OAP' in social usage*

| Library | Fragment | Intr. Org. Factor | Label | Code |
|---|---|---|---|---|
| **UU (UBB)** | *Golden open access is impossible within certain disciplines due to privacy or ethical constraints* | Social Usage | Barrier: privacy and ethics | Barrier for OAP |
| **UU (UBB)** | *Among researchers –especially in the humanities-the fear exists that in a system of open access other people are in control of whether you can publish at all.* | Social Usage | Barrier: fear of losing control | Barrier for OAP |
| **RUG** | *"There are also scientists, especially in the humanities, that it is an absurd idea that any citizen should be able to read scientific information, as this information is often too complex for them to understand. Especially when it is imposed, they say* | Social Usage | Barrier: Distrust in actual benefit of open access | Barrier for OAP |
| **Tilburg University** | *I often hear the argument that there are no open access journals of good quality in their discipline yet* | Social Usage | Barrier: Distrust for quality of open access | Barrier for OAP |

*Table 9. Example fragments with code 'Differences between disciplines' in the social usage*

| Library | Fragment | Intr. Org. Factor | Label | Code |
|---|---|---|---|---|
| **UU (UBU)** | *This differs per discipline* | Social Usage | Difference per discipline | Differences between disciplines |
| **Erasmus University** | *It's also different among the disciplines. A medical scientist will not easily get shocked by an APC of €2000, while this is extremely uncommon for a humanities scholar* | Social Usage | Subsidy has different influence among disciplines | Differences between disciplines |

## Organizational Facilitators

*Table 10. Example fragments with code 'Services provided by university library' in organizational facilitators*

| Library | Fragment | Intr. Org. Factor | Label | Code |
|---|---|---|---|---|
| **UU (UBB)** | *There is an open access-contact person for each discipline* | Organizational facilitators | Open access contact person available | Services provided by university library |
| **VU** | *there are disciplinary specialists within the university library who can answer questions about open access publishing. There is also an e-mail address for these kind of questions* | Organizational facilitators | Open access experts and e-mail address available | Services provided by university library |
| **Tilburg University** | *I think that universities should act collectively at disciplinary level, but at first each university has to act on its own to start it* | Organizational facilitators | Collective & Individual challenge | Services provided by university library |
| **VU** | *OA requires time from the university library. Although there has been a reorganisation with a cut in the number of employees in 2014, there are more activities with regard to OA at the moment than before* | Organizational Facilitators | OA more work than before | Services provided by university library |
| **Radboud RU** | *Yes, OA is a lot of work.* | Organizational Facilitators | Lot of work | Services provided by university library |
| **Leiden University (Walaeus)** | *No, I spend a couple of hours a week on OA* | Organizational Facilitators | Not particularly a lot of work | Services provided by university library |
| **Radboud RU** | *An important task we should carry out is to inform scientists that there is someone to support them. That's a point scientists struggle with; they want to publisher wherever they wish to without any constraints of administration, for example* | Organizational Facilitators | Need for support | Services provided by university library |
| **RUG** | *we cannot force scientists to publish in certain journals.* | Organizational Facilitators | No literal advice due to academic freedom | Services provided by university library |
| **Leiden University** | *No, I can only tell scientists what is possible within their discipline and what they could consider, but the choice is up to them* | Organizational Facilitators | No literal advice due to academic freedom | Services provided by university library |
| **EUR** | *we aim to prevent scientists having to register their work multiple times as we have noticed that this is perceived as the most annoying part* | Organizational Facilitators | Barrier: administrative process of OA publishing | Services provided by university library |
| **Leiden University (Walaeus)** | *We have to control for whether an author indeed is affiliated to our university and therefore has the* | Organizational facilitators | University library as controller | Services provided by university library |

| | | | | |
|---|---|---|---|---|
| | *right to publish in open access according to a deal with a publisher, for example."* | | | |
| **KNAW** | *We do not publish scientific articles ourselves, but we contribute at policy level* | Organizational facilitators | Policymaker | Services provided by university library |
| **TU Delft** | *We are not a publisher, but the university library operates several publisher services. Therefore, we act as a facilitator to ease the publishing process* | Organizational facilitators | University library as facilitator | Services provided by university library |
| **Maastricht University** | *Creating awareness on open access publishing is indeed one element."* | Organizational facilitators | Creating awareness on open access | Services provided by university library |
| **TU Delft** | *"We can set up the software and arrange the DOIs or ISSN-numbers, but we can also direct them towards existing publishers."* | Organizational facilitators | University library as facilitator | Services provided by university library |
| **RUG** | *We attend lunch meetings. Here, we provide information on open access publishing.* | Organizational facilitators | Informing scientists by giving presentations | Services provided by university library |
| **Leiden University** | *"Furthermore I sometimes visit a faculty to speak about open access, this is mostly on invitation."* | Organizational facilitators | Informing scientists by giving presentations | Services provided by university library |
| **Erasmus University** | *"We used to go to meetings at the university as much as possible, for example department meeting. We have put a lot of effort in it, but that resulted in little progress […] We have also organised a day on open access twice a year, which was attended by the same people each time."* | Organizational facilitators | Informing scientists by giving presentations has low impact | Informing scientists |
| **Radboud University** | *"Also, the board of the university is very positive with regard to open access publishing and the chairman of the board is regarded as a role model in open access publishing for scientists."* | Organizational facilitators | Open access policy: very supportive board | Services provided by university library |
| **TU Twente** | *Lately, the most intensive contact with scientists takes place through the open access fund, which was enacted in 2012, as researchers can apply for a grant from this fund when they want to publish in open access."* | Organizational facilitators | Open access fund | Services provided by university library |
| **Wageningen UR** | *"I give presentations about the advantages and disadvantages of and the practical affairs with regard to publishing in open access. Also, I answer the questions with regard to open access that the library receives. Furthermore, I have edited a special issue of the library's newsletter and posted an item at the library's website about open access."* | Organizational facilitators | Informing scientists by giving presentations / answering questions/ through newsletter | Services provided by university library |
| **UvA (AMC)** | *It would be great if we could take this to a higher level, as a lot of scientists still get confused in the administrative process of claiming APC costs* | Organizational facilitators | Barrier: administrative process of open access publishing | Services provided by university library |
| **VU** | *we provide a repository for green open access* | Organizational facilitators | Digital support | Services provided by university library |
| **EUR** | *When necessary, we take over as much administrative work as possible.* | Organizational facilitators | Support by taking over administrative work | Services provided by university library |

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| **TU Twente** | *We have a fund and an open access policy* | Organizational facilitators | Open access fund available & Open access policy | Services provided by university library |
| **KNAW** | *there is a clear guideline about what we expect from open access.* | Organizational facilitators | Open access guideline | Services provided by university library |
| **VU** | *In total, the open access team represents 1 FTE to open access.* | Organizational facilitators | Description of employees involved with open access: 1 FTE | Services provided by university library |
| **UU (UBU)** | *The total amount of people working with open access could be 60 or 70 people. If you would express that in FTE, I think it would be around 8-10 FTE* | Organizational facilitators | Description of employees involved with open access: 8-10 FTE | Services provided by university library |
| **Erasmus University** | *4 FTE* | Organizational facilitators | Description of employees involved with open access: 4 FTE | Services provided by university library |
| **Leiden University (Walaeus)** | *We have a registration system that doesn't indicate whether something is open access or not* | Organizational facilitators | Not yet registered | Services provide by university library |
| **KNAW** | *Yes, we register this* | Organizational facilitators | Has been registered | Services provide by university library |
| **Wageningen UR** | *Right now, we are working on it as it is being registered, but I don't have a full 100% overview."* | Organizational facilitators | Looking for appropriate system | Services provide by university library |
| **UU (UBB)** | *The open access fund is responsible for the registration process of open access publications.* | Organizational facilitators | Open access fund is responsible | Services provide by university library |
| **UU (UBB)** | *At a national level, the VSNU is responsible for the registration of open access publications* | Organizational facilitators | VSNU is responsible at national level | Services provide by university library |
| **UvA (AMC)** | *Providing a clear overview of the amount of open access publications is the responsibility of the institution* | Organizational facilitators | University is responsible | Services provide by university library |
| **VU** | *The scientist has to register his scientific output, with support of the university library* | Organizational facilitators | Scientist is responsible, library should provide support | Services provide by university library |
| **UU (UBU)** | *The university is responsible for monitoring the percentage of open access publications* | Organizational facilitators | University is responsible | Services provide by university library |

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| **Maastricht University** | *The faculties are responsible for registering the publications of their research groups* | Organizational facilitators | Faculties are responsible | Services provide by university library |
| **TU Delft** | *I am, together with a team with colleagues responsible for the university's contribution to the national registering system* | Organizational facilitators | Open access team is responsible | Services provide by university library |
| **RUG** | *That's someone that participates in this project on behalf of the RUG* | Organizational facilitators | VSNU is responsible | Services provide by university library |
| **Leiden University** | *The intention is that the scientist submits his work and that we will take care of the further administrative tasks and registration* | Organizational facilitators | Scientist is responsible, library should provide support | Services provide by university library Services provide by university library |
| **Tilburg University** | *I don't know yet. At first, I think the pure coordinators. Therefore, it's the responsibility of the library* | Organizational facilitators | University library is responsible | Services provide by university library |
| **Radboud RU** | *The people of the repository, and therefore the library.* | Organizational facilitators | University (library) is responsible | Services provide by university library |
| **TU Twente** | *There is the responsibility to register, which is a task for the research groups, in my opinion. Then, there is the responsibility of operating the registration. This is executed by the university library* | Organizational facilitators | Research group and university library have responsibilities | Services provide by university library |
| **KNAW** | *The institution is responsible for this registration* | Organizational facilitators | Institution is responsible | Services provide by university library |
| **Wageningen UR** | *The university library is responsible for the registration. We collect the data and so we monitor it. The scientist is responsible for the submission of his article* | Organizational facilitators | Scientist is responsible, library should provide support | Services provide by university library |
| **UU (UBB)** | *I think the university library could act as an enabler to find ad access information and centre of expertise with regard to the new publishing system. Then, the university library has a role as adviser* | Organizational facilitators | University library as enabler and advisor | Services provided by university library |
| **UvA (AMC)** | *the role of the university library will hardly change. However, the extent to which the activities of a university library change depends on the degree to which you are 'e-only'.* | Organizational facilitators | Role will hardly change, but will digitize | Services provided by university library |
| **Maastricht University** | *Put shortly: as a facilitator.* | Organizational facilitators | Facilitating role | Services provide by university library |
| **TU Delft** | *It will be more about copyrights, towards a more facilitating and advising role* | Organizational facilitators | Facilitating role | Services provide by university library |
| **Erasmus University** | *Everything will become electronic and digital and therefore it will be more and more about copyrights* | Organizational facilitators | Focus on electronic services and copyrights | Services provide by university library |
| **Tilburg University** | *I think that it will become a role as facilitator, but also informative* | Organizational facilitators | Facilitating and | Services provide by university library |

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| | | | informative role | |
| **Radboud RU** | *I think it will be more about supporting scientists, providing publishing platforms and an increase contribution to the peer-reviewing process* | Organizational facilitators | Facilitating and informative role with publishing tasks | Services provide by university library |
| **TU Twente** | *I don't think this role will change substantially. If it would change, I expect it to become more focused on open access and its responsibilities* | Organizational facilitators | Little change | Services provide by university library |
| **Leiden University (Walaeus)** | *I think that we will take up a more supporting role in the near future* | Organizational facilitators | Supporting role | Services provide by university library |
| **KNAW** | *We will maintain our role as policy maker and provider of facilities such as research registration systems, a data repository* | Organizational facilitators | Maintaining a facilitating role | Services provide by university library |
| **UU (UBB)** | *my role is providing advice and information with regard to open access publishing and I am not involved with the process of publishing itself* | Organizational facilitators | Assistance for scientists | Services provide by university library |
| **UU(UBB)** | *As university library, we are not a publisher. Instead, we act in a facilitating manner with regard to open access publishing".* | Organizational facilitators | University library as facilitator | Services provide by university library |
| **RUG** | *In general, the university library does not publish very much, but acts as a facilitator instead."* | Organizational facilitators | University library as facilitator | Services provide by university library |
| **Radboud University** | *I fully focus on facilitating publishing in open access* | Organizational facilitators | University library as facilitator | Services provide by university library |
| **TU Twente** | *"I am the open access coordinator for the university library and therefore I am more active in facilitating open access publishing."* | Organizational facilitators | University library as facilitator | Services provide by university library |

*Table 11. Example fragments with code 'barrier for OAP' in 'Organizational facilitators'*

| Library | Fragment | Intr. Org. Factor | Label | Code |
|---|---|---|---|---|
| **UvA (AMC)** | *Researchers choose to publish in a prestigious journal, indifferent for whether or not it is open access. After all, a researcher is not rewarded for an open access publication".* | Organizational facilitators | Barrier: Scientific evaluation system | Barrier for OAP |
| **UU (UBB)** | *Scientists fear that in a system of open access publishing, the decision what will be published and who can publish will be based on financial concerns, rather than quality."* | Organizational facilitators | Barrier: Fear for focus on financial incentives over quality | Barrier for OAP |
| **VU** | *"Having to pay for a publication, evokes the feeling that publishers will tend to focus on acquiring as much articles instead of a quality as high as possible."* | Organizational facilitators | Barrier: Fear for focus on financial incentives over quality | Barrier for OAP |
| **Maastricht University** | *"While making a report of scientific output or CV, an open access publication will not serve as an advantage during the evaluation. Instead, the evaluation will focus on factors such as the impact factor of the journals you've published in."* | Organizational facilitators | Barrier: Scientific evaluation does not reward open access | Barrier for OAP |
| **TU Delft** | *Scientists often need a lot of explanation, they are often opposed to open access because of unawareness of the topic* | Organizational facilitators | Barrier: unawareness | Barrier for OAP |
| **RUG** | *There is the common prejudice that open access directly means that your article is not peer-reviewed."* | Organizational facilitators | Barrier: Distrust in quality of open access | Barrier for OAP |

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| **Leiden University** | *A scientist aims to publish in the same journal as his peers do."* | Organizational facilitators | Barrier: Focus on peers | Barrier for OAP |
| **Tilburg University** | *they worry that with a publication uploaded in a repository in the post-print version, they cannot be properly cited as the page numbers will differ from the eventual publication in the journal* | Organizational facilitators | Barrier: Fear of missing out citations due to open access | Barrier for OAP |
| **Radboud University** | *The focus on impact factors; if a scientist has the possibility to publish in the most prestigious journal in your field, which is non-open access, I don't think that a scientist would prefer to publish in a lower-ranked open access journal instead. "* | Organizational facilitators | Barrier: Focus on impact factors | Barrier for OAP |
| **Leiden University (Walaeus)** | *it doesn't matter to most of the scientists whether they publish in open access or not. In the end, it's about the impact factor of the journal you publish in, not about whether this journal is open access or not."* | Organizational facilitators | Barrier: Focus on impact factors | Barrier for OAP |
| **Radboud RU** | *A PhD candidate told me that she simply doesn't always have the choice to publish in open access as her supervisor tells her to focus on her carrier* | Organizational facilitators | Barrier: PhDs are forces to focus on career | Barrier for OAP |
| **UU (UBB)** | *In a system of OA publishers could focus on acquiring as much publications as possible in order to make as much profit as possible* | Organizational facilitators | Barrier: Distrust in incentives of OA | Barrier for OAP |
| **UvA (AMC)** | *The obstacles of the transition towards OA are mainly financial constraints* | Organizational facilitators | Barrier: monetary constraints | Barrier for OAP |
| **VU** | *the major barrier hampering a transition towards OA publishing seems to be the distrust in the quality of OA* | Organizational facilitators | Barrier: Distrust in quality of OA | Barrier for OAP |
| **UU (UBU)** | *the way scientists are evaluated. That is still often based on the impact factor of the journals they have published in, while OA journals often are too young to have a sufficient impact factor* | Organizational facilitators | Barrier: Scientific evaluation | Barrier for OAP |
| **Erasmus University** | *The major barrier is the scientist's lack of knowledge about the total picture of scientific publishing, but also about the financial flows of the library* | Organizational facilitators | Barrier: Lack of knowledge | Barrier for OAP |
| **Radboud RU** | *As long as the scientific community values impact factors to such an extent, scientist will maintain a preference to publish in a high-ranked instead of OA-based journal* | Organizational facilitators | Barrier: Focus on impact factor | Barrier for OAP |
| **TU Twente** | *The evaluation of research hampers a transition towards OA. The second barrier is simply caused by financial constraints* | Organizational facilitators | Barrier: Scientific evaluation | Barrier for OAP |
| **Wageningen UR** | *There are so many different regulations, while there is no clear overview of what are the regulations for each journal and publisher* | Organizational facilitators | Barrier: no clarity of different regulations | Barrier for OAP |
| **UU (UBB)** | *some universities –technical universities in particular- cooperate with commercial firms that ply business confidentiality."* | Organizational facilitators | Barrier: privacy and business | Barrier for OAP |
| **TU Delft** | *We experience a lot of problems with the so-called predatory journals.* | Organizational facilitators | Barrier: Predatory journals | Barrier for OAP |

*Table 12. Example fragments with code 'practical solution' in Organizational Facilitators*

| Library | Fragment | Intr. Org. Factor | Label | Code |
|---|---|---|---|---|
| **VU** | *fewer focus on impact factors while reducing the costs.* | Organizational Facilitators | Reduce the focus in impact factor & Reduce costs | Practical solution |
| **VU** | *It would help if it was easier for a scientist to determine whether the journal he aims to publish in is included in a deal including OA* | Organizational Facilitators | Ease the determination of the fact whether a journal is OA | Practical solution |
| **RUG** | *I think it's all about money* | Organizational Facilitators | Reduce costs | Practical solution |
| **Tilburg University** | *Abolishing such evaluation criteria and focusing on quality instead of impact factors would offer a practical solution* | Organizational Facilitators | Reduce the focus in impact factor | Practical Solution |
| **TU Twente** | there should be made some change in the field of research evaluation. | Organizational Facilitators | Change the scientific evaluation model | Practical solution |
| **UU (UBB)** | *Having a close and good collaboration between the universities and publishers is very important* | Organizational facilitators | Close collaboration among universities | Practical solution |
| **UvA (AMC)** | *Negotiating at a central level as much as possible* | Organizational facilitators | Close collaboration among universities | Practical solution |
| **Leiden University** | *By focusing on green open access, you leave the choice for which publisher and journal to publish in up to the scientist* | Organizational facilitators | Focus on green instead of golden open access | Practical solution |
| **Erasmus University** | *There should be a clear policy set up by the university board* | Organizational facilitators | Open access policy | Practical solution |
| **Wageningen UR** | *There should come a clear policy from the board of the university as there is currently none* | Organizational facilitators | Open access policy | Practical solution |
| **Maastricht University** | *It's a collective challenge for the VSNU* | Organizational facilitators | Collective challenge | Practical solution |
| **TU Delft** | *It's both a challenge for each university on its own as a collective challenge* | Organizational facilitators | Collective & Individual challenge | Practical solution |
| **RUG** | *to actually get the movement started, you'll need to act collectively* | Organizational facilitators | Collective challenge | Practical solution |
| **Universiteit Leiden** | *To put open access on the agenda and making a statement, the big deals concerning open access of the Netherlands were very useful. But in the end, you'll have to get other countries on board as well* | Organizational facilitators | Worldwide challenge | Practical solution |
| **Radboud UR** | *It's a collective task. If you act on an institutional level, you'll achieve nothing* | Organizational facilitators | Collective challenge | Practical solution |

*Table 13. Example fragments with code 'Submission decision' in Organizational Facilitators*

| Library | Fragment | Intr. Org. Factor | Label | Code |
|---|---|---|---|---|
| **UU (UBB)** | *The new criteria of the NWO that each research funded by them should publish in OA make scientists more aware of his budget and what he wants to do with that. Therefore, it does not happen anymore that someone wants to publish in OA, but doesn't have any budget available anymore to do so* | Organizational Facilitators | APCs are taken into account | Submission decision |
| **UvA (AMC)** | *It occurs frequently that the additional costs of publishing in OA have not been taken into account However, these costs do not influence the choice for where to publish* | Organizational Facilitators | APCs are not taken into account | Submission decision |

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| **TU Delft** | *There are always scientists who only think about publishing costs once they are at the stadium of publishing* | Organizational Facilitators | APCs are not always taken into account | Submission decision |
| **Wageningen UR** | *Since grant providers have included OA into their demands, it has become something taken into consideration from the beginning. However, at this moment it's still something only thought of when the publication process is started and there's actually no research budget left* | Organizational Facilitators | APCs are taken into account if funder demands to | Submission decision |
| **UU (UBU)** | *If a scientist publishes on his own, it's totally up to him, unless it's a PhD student. In that case, the professor mentoring the PhD student will guide him where to publish* | Organizational Facilitators | Author decides, except for PhD | Submission decision |
| **Leiden University** | *The first author determines in what journal to publish in cooperation with his co-authors* | Organizational Facilitators | (Corresponding) author decides | Submission decision |
| **UvA (AMC)** | *I do not think subsidies influence the decision whether or not to publish in OA for a scientist. It's about the quality of the journal and the criteria of a grant provider* | Organizational Facilitators | Subsidy has no influence due to focus on prestige | Submission decision |
| **VU** | *I expect that subsidies or discounts for OA publishing influence the decision to publish in OA or not* | Organizational Facilitators | Subsidy has influence due to focus on prestige | Submission decision |
| **UU (UBU)** | *I think subsidies or discounts only influence this choice in second place* | Organizational Facilitators | Subsidy has influence in second place after the prestige of a journal | Submission decision |
| **RUG** | *A 100% grant or refund of the costs has a much stronger effect than a discount of, for example, 50%."* | Organizational Facilitators | Subsidy has more influence than discounts | Submission decision |
| **KNAW** | *I definitely hear voices going about not publishing in OA when you have to pay for it. Therefore, you could say that a subsidy would solve this* | Organizational Facilitators | Incentive: Subsidy takes barriers away | Submission decision |
| **Wageningen UR** | *Subsidies or discounts influence this for 100%. Mostly, people prefer to publish in OA, but regard to it as a nice side benefit if OA publishing is possible* | Organizational Facilitators | Subsidy has influence | Submission decision |

*Table 14. Example fragments with code 'Incentive for OAP' in Organizational facilitators*

| Library | Fragment | Intr. Org. Factor | Label | Code |
|---|---|---|---|---|
| **Radboud University** | *libraries or researchers contacted each other with the request to share a publication that they could not access themselves. This is a very time-consuming process [...] open access to all scientific information would support a scientist in performing his research more efficiently* | Organizational facilitators | Incentive: time saving | Incentive for OA |
| **TU Delft** | *A factor that stimulates OA is the fact that grant providers more and more demand scientists to publish in OA.* | Personal characteristics | Incentive: Criteria of grant provider | Incentive for OAP |
| **Maastricht University** | *If the grant provider demands the scientist to publish in open access, but otherwise it would simply be about publishing in a journal that renders them the most prestige* | Personal characteristics | Incentive: Criteria of grant provider | Incentive for OAP |
| **UvA (AMC)** | *Therefore, I think that once the large, prestigious journals become open access, the argument that open access articles are of low quality, will be dropped* | Personal characteristics | Incentive: Large publishers switching towards open access | Incentive for OAP |

# APPENDIX D- SPEARMAN CORRELATION

*Table 15. overview of correlations*

| | | Age | Career position | % published in non-OA | Valuation of OAP within discipline | Nr. of authors | Personal PU | Societal PU | PEU | Frequency of OAP within discipline | Attitude towards OAP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Age | Correlation Coefficient | 1.000 | .697** | .051 | -.060 | -.368** | -.075 | -.141 | .016 | -.054 | -.187** |
| | Sig. (2-tailed) | . | .000 | .545 | .487 | .000 | .302 | .050 | .830 | .495 | .009 |
| | N | 192 | 192 | 146 | 135 | 192 | 192 | 192 | 192 | 161 | 192 |
| Career position | Correlation Coefficient | .697** | 1.000 | -.059 | -.051 | -.223** | -.088 | -.092 | .109 | -.096 | -.129 |
| | Sig. (2-tailed) | .000 | . | .480 | .555 | .002 | .225 | .206 | .134 | .226 | .075 |
| | N | 192 | 192 | 146 | 135 | 192 | 192 | 192 | 192 | 161 | 192 |
| % published in non-OA | Correlation Coefficient | .051 | -.059 | 1.000 | -.064 | -.197* | -.207* | -.097 | -.239** | -.309** | -.197* |
| | Sig. (2-tailed) | .545 | .480 | . | .512 | .017 | .012 | .244 | .004 | .000 | .017 |
| | N | 146 | 146 | 146 | 108 | 146 | 146 | 146 | 146 | 128 | 146 |
| Valuation of OAP within discipline | Correlation Coefficient | -.060 | -.051 | -.064 | 1.000 | -.033 | .216* | -.083 | -.174* | .404** | .191* |
| | Sig. (2-tailed) | .487 | .555 | .512 | . | .704 | .012 | .336 | .044 | .000 | .026 |
| | N | 135 | 135 | 108 | 135 | 135 | 135 | 135 | 135 | 128 | 135 |
| Nr. of authors | Correlation Coefficient | -.368** | -.223** | -.197* | -.033 | 1.000 | .067 | .058 | .173* | .209** | .093 |
| | Sig. (2-tailed) | .000 | .002 | .017 | .704 | . | .356 | .421 | .016 | .008 | .199 |
| | N | 192 | 192 | 146 | 135 | 192 | 192 | 192 | 192 | 161 | 192 |
| Personal PU | Correlation Coefficient | -.075 | -.088 | -.207* | .216* | .067 | 1.000 | .262** | .220** | .274** | .423** |
| | Sig. (2-tailed) | .302 | .225 | .012 | .012 | .356 | . | .000 | .002 | .000 | .000 |
| | N | 192 | 192 | 146 | 135 | 192 | 192 | 192 | 192 | 161 | 192 |
| Societal PU | Correlation Coefficient | -.141 | -.092 | -.097 | -.083 | .058 | .262** | 1.000 | .270** | .117 | .619** |
| | Sig. (2-tailed) | .050 | .206 | .244 | .336 | .421 | .000 | . | .000 | .140 | .000 |
| | N | 192 | 192 | 146 | 135 | 192 | 192 | 192 | 192 | 161 | 192 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PEU | Correlation Coefficient | .016 | .109 | -.239** | -.174* | .173* | .220** | .270** | 1.000 | .146 | .217** |
| | Sig. (2-tailed) | .830 | .134 | .004 | .044 | .016 | .002 | .000 | . | .065 | .002 |
| | N | 192 | 192 | 146 | 135 | 192 | 192 | 192 | 192 | 161 | 192 |
| Frequency of OAP within discipline | Correlation Coefficient | -.054 | -.096 | -.309** | .404** | .209** | .274** | .117 | .146 | 1.000 | .260** |
| | Sig. (2-tailed) | .495 | .226 | .000 | .000 | .008 | .000 | .140 | .065 | . | .001 |
| | N | 161 | 161 | 128 | 128 | 161 | 161 | 161 | 161 | 161 | 161 |
| Attitude towards OAP | Correlation Coefficient | -.187** | -.129 | -.197* | .191* | .093 | .423** | .619** | .217** | .260** | 1.000 |
| | Sig. (2-tailed) | .009 | .075 | .017 | .026 | .199 | .000 | .000 | .002 | .001 | . |
| | N | 192 | 192 | 146 | 135 | 192 | 192 | 192 | 192 | 161 | 192 |
| **. Correlation is significant at the 0.01 level (2-tailed). | | | | | | | | | | | |
| *. Correlation is significant at the 0.05 level (2-tailed). | | | | | | | | | | | |
| Determinant = 0.009 | | | | | | | | | | | |

# APPENDIX E- KRUSKAL WALLIS ANALYSIS: DISCIPLINE

*Table 16. Levine's test for discipline*

| ANOVA | | | | | |
|---|---|---|---|---|---|
| Dif_abs | | | | | |
| | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | 12582.572 | 4 | 3145.643 | 1.149 | .336 |
| Within Groups | 440919.223 | 161 | 2738.629 | | |
| Total | 453501.795 | 165 | | | |

*Table 17. Kruskal Wallis Analysis for discipline vs. attitude towards OAP*

| Ranks | | | |
|---|---|---|---|
| | Discipline | N | Mean Rank |
| Attitude towards OAP | Humanities | 53 | 74.98 |
| | Physical | 21 | 89.52 |
| | Social | 48 | 91.55 |
| | Life | 30 | 86.62 |
| | Health | 14 | 72.43 |
| | Total | 166 | |

| Test Statistics[a,b] | |
|---|---|
| | Attitude towards OAP |
| Chi-Square | 4.831 |
| df | 4 |
| Asymp. Sig. | .305 |
| a. Kruskal Wallis Test | |
| b. Grouping Variable: Discipline | |

# APPENDIX F- KRUSKAL WALLIS ANALYSIS: NATURE OF DISCIPLINE

*Table 18. Levine's test for nature of discipline*

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| **Between Groups** | 12942.473 | 2 | 6471.236 | 2.467 | .088 |
| **Within Groups** | 495695.063 | 189 | 2622.725 | | |
| **Total** | 508637.536 | 191 | | | |

*Table 19. Kruskal Wallis Analysis for mono- and interdisciplinary nature of discipline vs. attitude towards OAP*

| **Ranks** | | | |
|---|---|---|---|
| | Nature of Discipline | N | Mean Rank |
| Attitude towards OAP | Mono | 61 | 57.41 |
| | Inter | 52 | 56.52 |
| | Total | 113 | |

| ***Test Statistics*** [a,b] | |
|---|---|
| | Attitude towards OAP |
| *Chi-Square* | *.024* |
| *df* | *1* |
| *Asymp. Sig.* | *.876* |
| *a. Kruskal Wallis Test* | |
| *b. Grouping Variable: Discipline_mono_multi* | |

*Table 20. Kruskal Wallis Analysis for mono- and multi-disciplinary nature of discipline vs. attitude towards OAP*

| **Ranks** | | | |
|---|---|---|---|
| | Nature of Discipline | N | Mean Rank |
| Attitude towards OAP | Mono | 61 | 77.80 |
| | Multi | 79 | 64.87 |
| | Total | 140 | |

| **Test Statistics** [a,b] | |
|---|---|
| | Attitude towards OAP |
| Chi-Square | 3.989 |
| df | 1 |
| Asymp. Sig. | .046 |
| a. Kruskal Wallis Test | |
| b. Grouping Variable: Discipline_mono_multi | |

*Table 21. Kruskal Wallis Analysis for inter- and multi-disciplinary nature of discipline vs. attitude towards OAP*

| Ranks | | | |
|---|---|---|---|
| | Nature of Discipline | N | Mean Rank |
| Attitude towards OAP | Inter | 52 | 72.63 |
| | Multi | 79 | 61.63 |
| | Total | 131 | |

| Test Statistics[a,b] | |
|---|---|
| | Attitude towards OAP |
| Chi-Square | 3.034 |
| df | 1 |
| Asymp. Sig. | .082 |
| a. Kruskal Wallis Test | |
| b. Grouping Variable: Discipline_mono_multi | |

*Table 22. Kruskal Wallis Analysis for nature of discipline in general vs. attitude towards OAP*

| Ranks | | | |
|---|---|---|---|
| | Nature of discipline | N | Mean Rank |
| Attitude towards OAP | Mono | 61 | 104.20 |
| | Inter | 52 | 102.65 |
| | Multi | 79 | 86.50 |
| | | | |
| | Total | 192 | |

| Test Statistics [a,b] | |
|---|---|
| | Attitude towards OAP |
| Chi-Square | 5.038 |
| df | 2 |
| Asymp. Sig. | .081 |
| a. Kruskal Wallis Test | |
| b. Grouping Variable: Discipline_mono_multi | |

# APPENDIX G- MANN WHITNEY ANALYSES

Table 23. Mann Whitney analysis for presence of OA-expert and attitude towards OAP

| Ranks | | | | |
|---|---|---|---|---|
| | OA-expert present | N | Mean Rank | Sum of Ranks |
| Attitude towards OAP | No | 27 | 38.28 | 1033.50 |
| | Yes | 53 | 41.63 | 2206.50 |
| | Total | 80 | | |

| Test Statistics[a] | |
|---|---|
| | Attitude towards OAP |
| Mann-Whitney U | 655.500 |
| Wilcoxon W | 1033.500 |
| Z | -.652 |
| Asymp. Sig. (2-tailed) | .514 |
| a. Grouping Variable: University_OAspecialist | |

*Table 24. Mann Whitney analysis for presence of OA-information sessions and attitude towards OAP*

| Ranks | | | | |
|---|---|---|---|---|
| | University_OAinfosession | N | Mean Rank | Sum of Ranks |
| Attitude towards OAP | No | 45 | 47.90 | 2155.50 |
| | Yes | 62 | 58.43 | 3622.50 |
| | Total | 107 | | |

| Test Statistics[a] | |
|---|---|
| | Attitude towards OAP |
| Mann-Whitney U | 1120.500 |
| Wilcoxon W | 2155.500 |
| Z | -1.849 |
| Asymp. Sig. (2-tailed) | .064 |
| a. Grouping Variable: University_OAinfosession | |

# APPENDIX H- CODING SCHEMES INTERVIEWS WITH SCIENTISTS

## Personal Characteristics

*Table 25. Example fragments with code 'barrier for OAP' 'personal characteristics'*

| University | Quote | Intr. Org. Factor | Label | Code |
|---|---|---|---|---|
| **UU** | *The goal is to publish as much as possible during the PhD program.* | Personal Characteristics | Goal of PhD: Focus on publishing | Barrier for OAP |
| **UU** | *I can imagine that, especially in the beginning of your career, you'll focus on the activities that will spur your career. This can sometimes clash with moral arguments.* | Personal Characteristics | Focus on career by younger scientists | Barrier for OAP |
| **UvA** | *One could wonder whether it's beneficial for a PhD student to publish everything in open access. The fact is that open access journals often have no sufficient impact factor yet. Therefore, it could be useful to publish in as much journals as possible, both the open access ones, but the more traditional ones that are well-known and appreciated among the discipline.* | Personal Characteristics | Focus on impact factor and career | Barrier for OAP |
| **UvA** | *I've noticed that young researchers think it's fine to publish in open access. However, they do wonder what effects open access publishing has on their career after their PhD program and therefore often think they should better publish in the high-impact journals after all.* | Personal Characteristics | Young researchers positive about OAP, but focus on career | Barrier for OAP |

*Table 26. Example fragments with code 'incentive for OAP' in 'personal characteristics'*

| University | Quote | Intr. Org. Factor | Label | Code |
|---|---|---|---|---|
| **UU** | *It's more like a moral belief that you want your results to be publicly available without having to pay for it.* | Personal Characteristics | OA as moral/ideal | Incentive for OAP |
| **UvA** | *It's up to the senior scientists to tell the younger scientists that it's about the quality of their research instead of the score the journal the article is published in.* | Personal Characteristics | Influence of older scientists on younger scientists | Incentive for OAP |
| **TU Delft** | *By publishing in open access you increase the chance for impact of your work and therefore, open access can be nothing but beneficial to your career.* | Personal Characteristics | OA increases the impact of your research | Incentive for OAP |

*Table 27. Example fragments with code 'Perception of OAP' in 'personal characteristics'*

| University | Quote | Int. Org. Factor | Label | Code |
|---|---|---|---|---|
| **UvA** | *I am a proponent of open access, especially from an ethical perspective on science. I think that science belongs to the public domain.* | Personal Characteristics | OA as ideal | Perception of OAP |
| **UvA** | *I want to reach as many people as possible with my research, even if these people cannot understand or interpret the results appropriately.* | Personal Characteristics | OA as ideal | Perception of OAP |
| **TU Delft** | *I am a supporter of open access as I believe that sience should contribute to the expansion of knowledge in the world and that this knowledge should not only be available to people who can afford it.* | Personal Characteristics | OAP as ideal | Perception of OAP |
| **UU** | *I definitely regard to open access as something positive.* | Personal Characteristics | Positive attitude towards OAP | Perception of OAP |
| **UU** | *I always have the fear that within a couple of years, it turns out to be unsustainable.* | Personal Characteristics | Perspective on future of OAP | Perception of OAP |

| | | | | |
|---|---|---|---|---|
| **UvA** | *Besides the proponents of open access, there are also librarians that question whether open access is indeed beneficial to science, or that it would lead to the publication of low-quality research.* | Personal Characteristics | Distrustful attitude towards OAP among librarians | Perception of OAP |

*Table 28. Example fragments with code 'Description of OAP' in 'personal characteristics'*

| University | *Fragment* | Intr. Org. Factor | Label | Code |
|---|---|---|---|---|
| **TU Delft** | *The dissemination not only entails publications. About half of this dissemination occurs through congresses. However, the average Senegalese is absolutely not able to go to a congress. Perhaps we could also open up this part of the research dissemination.* | Personal Characteristics | Opening up research to third world | Description of OAP |
| **UvA** | *It's not only free access to those publications, but that you can reuse these as well.* | Personal Characteristics | Reusability as criterion for OAP | Description of OAP |

*Table 29. Example fragments with code 'Demographics' in 'Personal characteristics*

| University | Quote | Intr. Org. Factor | Label | Code |
|---|---|---|---|---|
| **UU** | *I am 25 years old. […] I am a PhD-candidate at the mathematical institute* | Personal Characteristics | Age, function and discipline | Demographics |
| **UvA** | *I am 45 years old and I am professor by special appointment in Library and Information Sciences.* | Personal Characteristics | Age and function | Demographics |
| **TU Delft** | *I am 34 years old and I am a lecturer in Bio-informatics.* | Personal Characteristics | Age and function | Demographics |
| **UU** | *I am 51 years old and Professor in chemistry within the discipline of Life Sciences.* | Personal Characteristics | Age and function | Demographics |

## Social Usage

*Table 30. Example fragments with code 'Dissemination of information' in 'Social usage'*

| University | Quote | Intr. Org. Factor | Label | Code |
|---|---|---|---|---|
| **UU** | *My colleague has just published an article in open access from which I learned that it incurs costs to publish in open access and these costs can be quite high. Before that, I didn't know that.* | Social Usage | Awareness because of peer usage | Dissemination of information |
| **UvA** | *I am not influenced by others from the university, but as I am involved with the topic I do hear a lot about it through social media.* | Social Usage | No influence by peers, information through social media | Dissemination of information |

*Table 31. Example fragments with code 'Submission decision' in 'Social usage'*

| University | Quote | Intr. Org. Factor | Label | Code |
|---|---|---|---|---|
| **UU** | *Usually, you publish in collaboration with other scientists, so you'll have to agree upon where to submit the paper.* | Social usage | Decision in collaboration | Submission decision |
| **UU** | *It's a combination. You're willing to pay for a great journal.* | Social usage | Balancing morals and financial constraints | Submission decision |

*Table 32. Example fragments with code 'barrier for OAP' in Social Usage*

| University | Quote | Intr. Org. Factor | Label | Code |
|---|---|---|---|---|
| **UU** | *I know that within the biology and science it's quite common to publish in a small and specific set of articles that are definitely not open access, which is taken for granted.* | Social Usage | Stress on impact factor in other disciplines | Barrier for OAP |
| **UvA** | *No, on my own incentive. In the humanities, the pressure to publish in open access is not that strong.* | Social Usage | Academic discipline | Barrier for OAP |

*Table 33. Example fragments with code 'incentive for OAP' in 'Social Usage'*

| University | Quote | Intr. Org. Factor | Label | Code |
|---|---|---|---|---|
| **UU** | *I think that there is quite a liberal attitude towards publishing within the discipline of mathematics. Authors are ranked in alphabetical order and there's not so much hassle about who gets to be the first author etc. Therefore, people are not so focused and stressed about where they should publish, which makes them probably more relaxed with regard to open access.* | Social Usage | Academic discipline favourable environment for OAP | Incentive for OAP |
| **UU** | *The impact factor is not that important within mathematics.* | Social Usage | Little stress on impact factor in discipline | Incentive for OAP |

*Table 34. Example fragments with code 'Academic discipline' in Social usage'*

| University | Quote | Intr. Org. Factor | Label | Code |
|---|---|---|---|---|
| **UU** | *I work at the mathematical institute.* | Social Usage | Academic discipline | Academic discipline |
| **UU** | *Usually, we publish with 1, 2 or 3 authors* | Social Usage | Amount of authors | Academic discipline |
| **UU** | *Within theoretical mathematics it's already common to post pre-print versions of your paper on a website.* | Social Usage | Common to post pre-pints | Academic discipline: positive attitude |
| **UvA** | *No, on my own incentive. In the humanities, the pressure to publish in open access is not that strong.* | Social Usage | Academic discipline | Academic discipline |
| **UvA** | *We usually publish an article with 2 or 3 authors.* | Social Usage | Amount of authors | Academic discipline |
| **UvA** | *The discipline is more inter-disciplinary of nature* | Social Usage | Nature of discipline | Academic discipline |
| **UU** | *We usually publish an article with 5 authors.* | Social Usage | Amount of authors | Academic discipline |

## Organizational facilitators

*Table 35. Example fragments with code 'incentive for OAP' in 'Organizational facilitators'*

| University | Quote | Intr. Org Factor | Label | Code |
|---|---|---|---|---|
| **UU** | *It's supportive that the NWO grants subsidies.* | Organizational facilitators | Subsidies stimulate OA | Incentive for OAP |
| **UU** | *To be honest, I never heard from anyone who is opposed to open access.* | Organizational facilitators | Everyone is in favour of OAP | Incentive for OAP |
| **UU** | *I mean, if journals such as Nature and Science decide to switch towards open access, there is no reason left for other journals not to enable open access.* | Organizational facilitators | Pressure on smaller journals to open up | Incentive for OAP |
| **UU** | *There's such a competition for financial resources, so I think it's the only incentive.* | Organizational facilitators | Financial resources as incentive for OAP | Incentive for OAP |
| **UvA** | *Open access is eased by the digitation of the publishing industry.* | Organizational facilitators | Digitizing publishing industry | Incentive for OAP |
| **UvA** | *The idea of 'best journal' will slowly disappear since the focus will rather be on the quality of the article than the quality of the platform you publish in.* | Organizational facilitators | Focus on impact factor will diminish | Incentive for OAP |
| **UvA** | *The open access policy of large grant providers definitely stimulates the publication of open access articles.* | Organizational facilitators | OA-policy of grant | Incentive for OAP |

| | | | | |
|---|---|---|---|---|
| | | | providers works | |
| **UU** | *Many grant providers demand you to publish in open access, which you'll therefore try to do.* | Organizational facilitators | OA-policy of grant providers works | Incentive for OAP |
| **UU** | *I belief that if you make your work public, you'll receive more notoriety and a better use of your tools. Therefore, you can only benefit from open access.* | Organizational facilitators | OA increases research visibility | Incentive for OAP |
| **TU Delft** | *Scientists publish in open access because of three reasons:*<br>*First, because they have to in order to comply to the criteria of the grant provider. Second, because open access increases the research visibility. Third, because of ethical reasons.* | Organizational facilitators | Reasons to publish in OA | Incentive for OAP |

*Table 36. Example fragments with code 'dissemination of information' in 'organizational facilitators'*

| University | Quote | Intr. Org. Factor | Label | Code |
|---|---|---|---|---|
| **UU** | *You'll have to look for it at Intranet by yourself.* | Organizational facilitators | Information has to be looked up | Dissemination of information |
| **UU** | *I don't want to look up the policy of each journal. This is something that should be facilitated.* | Organizational facilitators | Need for overview of policies | Dissemination of information |
| **UU** | *I haven't heard about it from outside the faculty.* | organizational facilitator | Little information available | Dissemination of information |
| **UU** | *We receive so many different sorts of newsletters, that it could very well be that I've missed out on that information.* | organizational facilitator | Overload of information | Dissemination of information |
| **UU** | *We're not telling people where they should publish. Usually, they know this themselves.* | organizational facilitator | No active advice on where to publish | Dissemination of information |
| **UU** | *I would say that if the university or EU directs us towards open access, they would provide us with a list of journals, as we are already busy enough. If you'll have to look everything up by yourself, there are other things that have priority.* | organizational facilitator | Need for overview of OA journals | Dissemination of information |

*Table 37. Example fragments with code 'Submission decision' in the organizational facilitators*

| University | Quote | Intr. Org. Factor | Label | Code |
|---|---|---|---|---|
| **UU** | *I always discuss with my supervisor where to submit my articles* | Organizational Facilitators | Supervisor helps in decision where to publish | Submission decision |

*Table 38. Example fragments with code 'barrier for OAP' in 'Organizational Facilitators'*

| University | Quote | Intr. Org. Factor | Label | Code |
|---|---|---|---|---|
| **UU** | *Actually, I think it never stops, if I'm honest. Perhaps it turns out to be that you're used to publish in certain journals by then. It might be the case that the pressure to publish diminishes, but you'll want to be sure that the journal you publish in are of a good quality. Furthermore, it's harder to attain financial resources once you're progressed in your career, so perhaps you'll focus on publishing costs even more. Therefore, I don't think you will then publish in open access more, unfortunately.* | Organizational Facilitators | When career proceeds, you can get locked-in to publishing methods | Barrier for OAP |
| **UvA** | *It depends on the publishers. Some of them charge very high costs. After all, you have to ensure that your costs are covered, otherwise the party can't go on.* | Organizational Facilitators | Costs of OAP | Barrier for OAP |

| | | | | |
|---|---|---|---|---|
| **UU** | *The EU obliges you to published in open access to receive their funding. However, in their decision who gets a subsidy is still based on the cv, publications and in which journals those publications have been done and therefore on the old fashioned impact factor.* | Organizational Facilitators | Hypocrisy of research evaluation | Barrier for OAP |
| **UU** | *Both the NWO and the EU demand you to publish in open access, but they will not blame you if you publish in Nature or Science, I guess.* | Organizational Facilitators | Hypocrisy of research evaluation | Barrier for OAP |
| **UU** | *We're still taught to focus on the impact factor. So, whatever you say, the impact factor will remain important.* | Organizational Facilitators | Focus on impact factor | Barrier for OAP |
| **TU Delft** | *Money poses a barrier* | Organizational Facilitators | Monetary constraints | Barrier for OAP |
| **TU Delft** | *Publishing in open access doesn't really matter. It's good if you do so, but it has no consequences if you don't.* | Organizational Facilitators | No consequences of publishing in non-OA | Barrier for OAP |
| **TU Delft** | *The most important thing is that your research is read and cited with the latter being the most important. In the past, you were rewarded for your list of publications. Nowadays, you're evaluated based on the amount of citations; the visibility and impact of your research is measured with the amount of citations you receive.* | Organizational Facilitators | Focus on citations and impact | Barrier for OAP |
| **UvA** | *Reputation and publishing should be separated from each other.* | Organizational Facilitators | Solution | Barrier for OAP |
| **UU** | *It's not obligatory, so to publish in open access would really be something you do at your own incentive and motivation.* | organizational facilitator | No obligation to publish in OA | Barrier for OAP |
| **UU** | *"I don't know whether there is a mandate. I should actually know that."* | organizational facilitator | Unaware of OA-policy | Barrier for OAP |
| **UU** | *If you have the choice between publishing in an open access journal and a Science journal, you'll go for Science as this journal has more impact.* | Social Usage | Focus on impact factor | Barrier for OAP |
| **UU** | *If you have the choice to publish in the non-open access Nature or the open access journal PLoS and you know that your paper is accepted by both, you obviously go for a publication in Nature.* | Social Usage | Focus on prestige | Barrier for OAP |
| **TU Delft** | *If I want to publish an article, I have to choose in which journal I want it to be published. Whether this journal is open access plays a small, but substantial role in this decision: journals that are open access are on up on in comparison to non-open access journals. However, those journals such as Nature and Science are one up on others because they are of such high quality. Therefore, whether a journal is open access is something I definitely check, but not the most important criterion to select a journal.* | Social Usage | Decision process where to submit | Barrier for OAP |
| **UvA** | *I think that scientist in general prefer to publish in the well-known journals than the newer open access journals.* | Social Usage | Focus on well-known journals | Barrier for OAP |