Publication Forum 2010–2020: Self-evaluation report of the Finnish quality classification system of peer-reviewed publication channels

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Executive summary

Publication Forum (JUFO) is a Finnish national classification system of peer-reviewed publication channels. JUFO categorises publication channels into four classes according to the publication channels' average quality, impact, and prestige. The evaluation work is carried out by 250 experts in 23 panels covering all fields of science. The main purpose of the JUFO classification is to provide a quality measure of the universities' publishing performance for the Finnish Ministry of Education and Culture's performance-based research funding system for higher education institutions. In Finland, extensive input and output statistics, enabling funding of universities by results, have been developed since the 1990s. JUFO classification was established in 2010, and it was included among the funding criteria of universities in 2015.

The present report is the deliverable of a self-evaluation process of the Finnish JUFO system conducted between 2019 and 2020 by a working group nominated by the JUFO Steering Group from among its members. The self-evaluation was based on a review of pre-existing research and documentation, a survey of JUFO expert panellists, and a variety of newly conducted analyses based on the national publication data and Web of Science. The objective of the self-evaluation was to support the JUFO system's further development by examining the international context and organisation of the JUFO classification, the criteria and characteristics of JUFO levels as a quality indicator of universities' publishing performance, as well as the trends of scholarly publishing in Finland.

Below is a brief overview of the self-evaluation's five key questions and main results:

1.   How do the logic and working of JUFO compare with international benchmarks?

The type of classification system of publication channels represented by JUFO is an evaluation model originally developed in Norway and later adopted in some other European countries for distributing government funding for higher education institu-

tions. While funding models using quantitative indicators are increasingly common, publication performance indicators based on international databases (e.g. Web of Science and Scopus) and impact factors remain seriously limited in their coverage of peer-reviewed publications. A classification of publication channels created by the national research community supports distribution of funding based on comprehensive publication data covering all fields, publication types, and languages. The JUFO-based indicator – focusing on macro-level publishing performance of universities rather than individual publications or researchers – is consistent with the main principles of responsible metrics, such as robustness, transparency, diversity, and reflectivity.

2.   Are JUFO procedures organised effectively?

A classification system like JUFO is a very cost-effective way of organising the overall quality assessment of publication output for the performance-based funding model of Finnish universities. Compared to similar systems abroad, JUFO maintains a comprehensive list of publication channels with a smaller number of expert panellists than Denmark and Norway. This suggests that JUFO also has somewhat higher efficiency than the most immediate international benchmarks. At the same time, this elicits a concern about the panellists' workload. The panellists' workload can be decreased by shifting some of their tasks to the JUFO secretariat, and by improving the information and web tools, particularly the JUFO portal, supporting the panellists' evaluation tasks.

3.   Do JUFO classification levels provide a valid and balanced quality indicator across fields?

JUFO levels are a relatively neutral quality indicator of the universities' publication output across the main scientific fields, including multidisciplinary publications. There is no indication of severe national bias, as the expert-based JUFO classification of publication channels corresponds, largely, with other indicators of publication quality and impact (e.g., the citation analysis of the impact of Finnish research, and research projects which have received funding based on the international peer re-

view). JUFO classifications also take national languages and open access adequately into account.

4.   For what purposes is the JUFO classification used in the scientific community in Finland?

The primary – and only official – use purpose of JUFO is to serve as an indicator of the quality of universities' publication performance for the funding model of the Ministry of Education and Culture. However, Finnish universities and other actors also use JUFO classifications for secondary, unofficial purposes. These include uses of JUFO to support universities' research assessments, to monitor and develop publishing activities, and for funding allocation to subunits. In some instances, JUFO is also used for evaluation purposes at the individual level. To prevent the inappropriate use of JUFO levels for the evaluation of individual researchers, the JUFO's Steering Group has published a guideline for the responsible use of the JUFO classification.

5.   What kind of changes in publishing patterns in Finland have coincided with the introduction and adjustments of JUFO classifications?

The first JUFO classification was published in 2012, and it as included among the universities' funding model in 2015. Since 2011, peer-reviewed outputs of the Finnish universities have been increasingly published in publication channels of higher JUFO level 2 and 3, and there has been a marked decline of publishing in publication channels on JUFO level 0. This development has not taken place at the expense of the diversity of scholarly communication practices, such as publishing in national languages, books and conferences, open access publishing, domestic and international collaboration, or publishing to professional and general audiences.

The self-evaluation working group offers 12 recommendations and 7 considerations regarding the further development and implementation of the JUFO system. Below is the list of recommendations regarding stakeholders, JUFO levels, panel work, and the JUFO portal. A more detailed list of recommendations and additional considerations is provided in Chapter 7.

Recommendations for stakeholders:

1. Research performing and funding organisations should commit to the National Recommendations for *Good Practice in Researcher Evaluation* (2020), and follow the *User Guide for the Publication Forum Classification* (2020) for the responsible use of the JUFO levels in various evaluation contexts.

2. In collaboration with its shareholders, the JUFO secretariat should establish a systematic annual monitoring of the quality and open access of publication channels used by the Finnish researchers.

Recommendations regarding JUFO levels:

3. The JUFO Steering Group should retain the current number of JUFO levels (0, 1, 2, 3), because there is no broad consensus concerning the need to remove level 3 from the JUFO classification.

4. The JUFO Steering Group should increase the publication volume share of JUFO level 2 and 3 journals/series to improve the equal treatment of various research specialties.

5. The JUFO Steering Group should increase differentiation and make the various reasons publication channels assigned to JUFO level 0 visible in the JUFO portal.

6. The JUFO Steering Group should facilitate Expert Panel decision making by clarifying and prioritising evaluation criteria, clearly communicating policy considerations, and – if necessary – by also establishing clearer minimum requirements for JUFO levels 2 and 3.

Recommendations regarding panel work:

7. The JUFO secretariat should decrease the workload of expert panellists by improving the information base supporting channel evaluation, taking administrative decisions regarding JUFO levels 0 and 1, and assisting expert judgement with automated rankings.

8. The JUFO secretariat should systematise announcements of engagements by panellists and improve the information base concerning memberships in editorial functions and boards and publications.

9. The JUFO Steering Group should explore options for using international experts in evaluation panels, for example, in Nordic collaboration, to increase the international base of expert assessment.

Recommendations regarding the JUFO portal:

10. The JUFO secretariat should improve the transparency of expert evaluation by making all the information supporting expert judgement, as well as panels' grounds for level assignments, available to members of the research community in the JUFO portal.

11. The JUFO secretariat should extend JUFO portal services with more comprehensive open access information to advance OA publishing by helping the Finnish research community to identify OA publishing options, benefits provided by FinELib, and compliance with research funder requirements.

12. The JUFO secretariat should develop international infrastructures (e.g., the Nordic list), collaboration, and research (e.g., identification of questionable journals) to support evaluation of publication channels, as well as to advance responsible assessment culture.

1. Introduction

This report contains the results of the self-evaluation of the Finnish national classification system of publication channels, i.e. the "Publication Forum" (in Finnish "Julkaisufoorumi"), which is also known by the acronym "JUFO". JUFO was established in 2010 to support the performance-based research funding system (PRFS) for higher education institutions in Finland. The present self-evaluation was conducted by a working group, which was assigned with the self-evaluation task by the JUFO Steering Group in 2019. The working group members are a subset of the members of the JUFO Steering Group, which in turn was appointed for a four-year period (2016–2019) by the Board of Directors of the Federation of Finnish Learned Societies. A new Steering Group for the 2020–2030 period was appointed in 2019.

The broad purpose of the evaluation was to facilitate the further development efforts of the JUFO classification, and the entire classification system and procedure. To this end, the specific objective of the self-evaluation exercise was to address the following questions:

1. How do the logic and working of JUFO compare with international benchmarks?
2. Are JUFO procedures organised effectively?
3. Do JUFO classification levels provide a valid and balanced quality indicator across fields?
4. For what purposes is the JUFO classification used in the scientific community in Finland?
5. What kind of changes in publishing patterns in Finland have coincided with the introduction and adjustments of JUFO classifications?

The main findings and recommendations are provided in the executive summary. In Chapter 1, we further describe the background, objectives, and methods of self-evaluation. Analyses and findings are reported in thematic Chapters 2–6, followed by rec-

ommendations in Chapter 7. References are given in Chapter 8, and supplementary materials are provided in the Appendix at the end of this report.

1.1. JUFO in brief

JUFO is a Finnish national classification scheme of peer-reviewed publication channels (journals, conferences, and book publishers). In essence, JUFO categorises publication channels into four classes or "JUFO levels" (1=normal, 2=leading, 3=top, 0=other) according to the publication channels' average quality, impact, and prestige – as assessed by 250 experts in 23 panels covering all the main scientific fields. Since 2010, JUFO classification procedures have been coordinated by the Federation of Finnish Learned Societies. In practice, the Federation of Finnish Learned Societies appoints a Steering Group for JUFO consisting of representatives of key actors from the scientific community; hosts a JUFO secretariat (2 full-time persons); and coordinates the work of 23 Expert Panels (Auranen & Pölönen, 2012; Pölönen & Ruth, 2015; Pölönen, 2018a).

The main purpose of the JUFO classification is to provide a publication quality measure for the Finnish Ministry of Education and Culture's performance-based research funding system (PRFS) for higher education institutions, especially universities. As the volume of publications in various JUFO-classified channels (i.e. "JUFO publication points") has been one performance indicator (among a dozen or so others) of the PRFS since 2015, the Ministry's annual budget funding for Finnish universities is partly determined by the JUFO levels of the publication channels in which the university researchers publish their research. In the funding model, the JUFO publication points are intended to reflect the volume and average quality of the entire peer-reviewed publication output of a university (i.e. the funding model does not evaluate the quality of individual publications or individual researchers). Up to 13% of state core funding is allocated annually to universities based on the JUFO publication points.

1.2. Background of JUFO

In this section, we describe the development of performance-based funding and the establishment of the JUFO classification of publication channels.

1.2.1. Development of performance-based funding model

University funding by the government in Finland has been partly based on performance since the 1990s, since the establishment of performance agreements (between the Ministry of Education and Culture and universities), funding models, and the KOTA database for input and output statistics. The main policy goals behind the performance-based research funding system (PRFS) in Finland have been to enhance the efficiency, internationalisation, quality, and impact of educational and research activities; to gain insights into the performance of the Finnish higher education institutions; and to create accountability and transparency regarding the use of public funds (De Boer et al., 2015; Aarrevaara, Wahlfors & Dobson 2018; Kivistö et al., 2019). In the current Ministry of Education and Culture funding model, used in 2017-2020, 41% of core funding is allocated to universities on the basis of indicators measuring performance in education, 33% is based on research performance indicators (including 13% based on JUFO publication points), and 28% is determined by other policy considerations.

One of the indicators measuring research performance is based on the number of publications the universities produce. This indicator is based on the PRFS model established in 2005 in Norway and adopted in Denmark in 2009 (Sivertsen, 2018; Aagaard, 2018; Pölönen, 2018a). Since 2011, the publication numbers are based on comprehensive data collected and integrated at national level from the universities' current research information systems (CRIS) by CSC – IT Center for Science. To avoid the risk of promoting quantity at the expense of quality, since 2015, the Ministry's funding model has weighed the number of publications according to the JUFO levels. As with all the other performance indicators in the Ministry's PRFS, the stability of the

JUFO publication indicator is supported by calculating the following year's funding based on the average performance or outputs of the three previous years (e.g. funding for 2015 is based on outputs published in 2011–2013).

1.2.2. Establishment of the JUFO classification

Publication Forum (JUFO) was established in 2010 on the recommendation of a working group set up by the Finnish Council of University Rectors (now Universities Finland). The working group proposed that an evaluation system for the quality of publications should be developed that would make it possible to increase the weighting of research performance indicators compared with education performance indicators in the funding model of the Ministry of Education and Culture for universities. Indeed, the weighting and share of research publications had been only 0.3% in the 2007–2009 funding model, and 1.7% in 2010–2012. After the aforementioned recommendation, the share of research-related indicators increased to 13% in 2013. Simultaneously, a performance indicator based on JUFO levels was developed to replace the previous system, in which a distinction was only made between international refereed publications (9%) vs "other" publications (including domestic publications, 4%).

Universities Finland's working group recommended – having considered the advantages and disadvantages of a model in place in Norway (see Appendix 1, Table 1) – that besides measuring the volume or quantity of research publications, a quality index would also be developed in Finland, in which peer-reviewed publication channels would be identified and classified by quality levels by the experts in the field. A citation analysis-based indicator was also considered as an alternative, but it was not chosen, because the international databases (Web of Science and Scopus) were considered to have an inadequate coverage of publication channels, especially in the fields of Engineering, and Social Sciences and Humanities (e.g. conference proceedings, books, and publication channels in domestic languages and foreign languages other than English). Cost-effectiveness was also considered one of the advantages of the benchmarked Norwegian model, even if running the system would necessitate the employment of some full-time human resources. The cost-effectiveness of the

Finnish JUFO system in place in 2020 is further assessed below in Section 3.6.

According to the Universities Finland working group, one of the main benefits of a JUFO classification is that it allows the scientific community to determine what constitutes good research and the criteria in place to assess it. The development of the quality assessment of publications based on JUFO thus served several interests:

1. The funding model of the Ministry of Education and Culture
2. The university's internal information interest, e.g. benchmarking in relation to other similar universities (nationally and internationally), publication profiles of departments, development of the university's internal funding model
3. Influencing the researcher's choices by making the average quality level of the publication channels visible.

1.3. JUFO self-evaluation

In this section, we describe the background, aims, and objectives of the present JUFO self-evaluation.

1.3.1. Setting-up the self-evaluation of JUFO

Given the various implications of the PRFS for government, society, universities and higher education institutions, and the scientific community, the effectiveness of the publication indicator in promoting the quality and productivity of research in Finland is a high-priority issue. In Finland, as in the other Nordic countries using the Norwegian model, concerns have especially been raised about the legitimacy, validity, and neutrality of JUFO indicators across different fields (Sivertsen & Schneider, 2012; Aagaard et al., 2014; Söderlind et al., 2019). Furthermore, the potentially negative effects of the JUFO system on multidisciplinarity (Pihlström, 2014; Meriläinen, 2015) and scholarly publishing in domestic languages (besides English) in particular have been debated in Finland. For example, as early as 2012, 60 learned societies issued a statement to support the diversity of scholarly publishing (Toimituskunta, 2012). The

relationship between the JUFO classification and various open access and open science policies have also been increasingly debated (Ikonen, 2018; Pölönen, 2018b).

In Finland, several broad-based working groups appointed by the Ministry of Education and Culture have considered the fitness of the JUFO system for measuring the quality of the universities' publication outputs for the Ministry's funding model (Ministry of Education and Culture, 2011; 2014; 2015). Based on the proposal of the latest "Vision 2030" working group in 2018, the share of core funding of universities allocated based on JUFO publication points was further increased from 13% to 14% for 2021–2024 (Ministry of Education and Culture, 2018). The JUFO Steering Group itself has also constantly followed the national discussion and introduced improvements to increase the number of national language channels at level 2 (Auranen & Pölönen, 2012; 2014; Pölönen & Auranen, 2018) and improve the balance of the JUFO levels across different scientific fields (Pölönen & Ruth, 2015), for example.

Nevertheless, in Finland – unlike Denmark and Norway – the JUFO system has not been comprehensively self-evaluated thus far. In October 2016, the JUFO Steering Group therefore decided, following a proposal from a working group producing a mid-term evaluation of the Federation of Finnish Learned Societies strategy for 2014–2018, to carry out a self-evaluation of JUFO during 2019–2020. In December 2018 and March 2019, the Steering Group agreed that the main purpose of the self-evaluation was to support the further development and improvement of the JUFO classification. The JUFO secretariat was entrusted with the task of conducting the self-evaluation, and a working group from among the members of the steering group was appointed to coordinate the self-evaluation exercise:

- Jaakko Aspara, chair (Hanken School of Economics & Universities Finland)
- Hanna-Mari Puuska (CSC – IT Center for Science)
- Elina Pylvänäinen (Federation of Finnish Learned Societies), since May 2020
- Janne Pölönen (Federation of Finnish Learned Societies)
- Risto Rinne (University of Turku)
- Eeva Savolainen (Federation of Finnish Learned Societies), until April 2020

1.3.2. Objectives and structure of the self-evaluation

In Denmark (Sivertsen & Schneider, 2012) and Norway (Aagaard et al., 2014; Aagaard et al., 2015), the publication indicator systems have been comprehensively evaluated. In both countries, the evaluations have addressed the effects of the publication indicator on publishing productivity and quality, as well as potential negative effects such as the promotion of quantity at the expense of quality and the decrease of national language publishing. In addition, the evaluations have also addressed the validity of publication quality classes/levels and their neutrality across fields, the organisation of the evaluation process, and the local use of the indicator system in universities for evaluation purposes other than the funding model (see Appendix 1, Table 2).

Even if the publication indicator has not thus far been comprehensively evaluated in Finland, its overall effects on research performance have already been investigated and considered in two reports. An evaluation of the impact of the reform of the Universities Act (2010) concluded that the publication indicator had a positive effect on the quality of universities' publishing activities in 2011–2014 as measured by the JUFO levels (Ministry of Education and Culture, 2016). More recently, the Economic Policy Council assessed the overall effects and incentives created by the Ministry's funding model for higher education institutions (Seuri & Vartiainen, 2018). This evaluation's main findings regarding the JUFO classification can be summarised as follows:

- Between 2011 and 2016, the Finnish universities' publication performance increased, as peer-reviewed outputs were increasingly published in channels with higher JUFO levels.
- Differences between universities decreased, as the weakest performing universities in 2011 were able to increase their publication performance most by 2016.
- There were field-specific differences in the universities' publication performance when publication counts weighted with JUFO levels were related to the academic faculty headcount.
- A larger share of the Finnish universities' output than the world output was

published in the JUFO level 2 and 3 channels, raising the question about a possible national bias in JUFO classifications.

In 2018, the JUFO Steering Group agreed that the self-evaluation to be conducted should focus on the organisation, validity, and use of the JUFO classification as a quality indicator per se, while not considering extensively the Ministry's funding model or its effects. In other words, because the potential effects of the performance-based funding system on publication volume and quality are determined by the weights given in the funding model to publication volumes in different JUFO classes – not by the JUFO classes/classification themselves – thorough analyses of these effects were excluded from the scope of this self-evaluation exercise. Indeed, the Steering Group, operating under the auspices of the Federation of Finnish Learned Societies, is responsible only for creating and maintaining the JUFO classification of publication channels themselves, whereas it is the duty of the Ministry's own working groups to make assessments of the causal and correlational effects of the JUFO classification (and the weights given to publication volumes in different JUFO classes) on universities' research and publication performance. Thus, to the extent that the publication performance patterns of Finnish universities are reported in this report (Chapter 6), the reporting is done primarily with the aim of raising questions for future assessments to answer rather than to provide conclusive findings about the effects the JUFO system, or its role in the funding model, has on universities' publication patterns and performance.

In 2018, taking into account the evaluations carried out in Denmark and Norway and earlier reports on the effects of JUFO in Finland, as well as the national discussions concerning the JUFO system, the Steering Group agreed that the objective of the self-evaluation was to address the questions listed in Table 1.1. below. This table also serves as an outline of the chapters of the present self-evaluation report.

Table 1.1. Objectives and outline of the self-evaluation report

Objective/question	Chapter of this report	Contents of the chapter
1) How do the logic and working of JUFO compare with international benchmarks?	Chapter 2	• gives an overview of the recent development of the publication performance-based funding systems at the Nordic, European and global levels • discusses how the JUFO classification compares with other publication quality indicators' systems
2) Are the JUFO procedures organised effectively?	Chapter 3	• describes the organisation and work of the JUFO secretariat, Steering Group, and panels at the Federation of Finnish Learned Societies compared with those in Denmark and Norway • describes the collaboration with CSC regarding the technical maintenance and development of the JUFO database and JUFO portal, as well as the participation of stakeholders
3) Do JUFO classification levels provide a valid and balanced quality indicator across fields?	Chapter 4	• describes the number and nature of classes/levels in the JUFO classification system • describes the methods of classification for different publication channel types (journals/series, conferences, and book publishers), as well as their division between panels • analyses how balanced the JUFO levels are across the main scientific fields, publication types, and languages • provides a Web of Science-based citation analysis of how the JUFO levels reflect differences in the scientific impact of Finnish research
4) For what purposes is the JUFO classification used in the scientific community in Finland?	Chapter 5	• describes the main use purpose of JUFO levels in the funding model of the Ministry of Education and Culture • describes unofficial secondary use purposes of the JUFO classification in research organisations
5) What kind of changes in publishing patterns in Finland have coincided with the introduction and adjustments of JUFO classifications?	Chapter 6	• describes and depicts changes in publishing patterns and performance in Finland coinciding with the introduction and adjustments of the JUFO system (between 2011 and 2017) • does not, however, provide any conclusive analysis/results of the causal or correlational effects that the JUFO system, or its weights and role in the university funding model, have had on the quality and quantity of universities in Finland

1.4. Methods and data

This self-evaluation utilises and presents earlier research, reports, literature, and documentation on the JUFO system, as well as newly collected data and analyses specifically designed for this self-evaluation. The newly collected data and their analyses include:

- VIRTA: a bibliometric analysis of Finnish universities' publications 2011–2017 based on institutional CRIS data integrated at national level
- These data consist of the peer-reviewed and non-peer-reviewed outputs published between 2011 and 2017, including all publication types and languages, which the 14 Finnish universities have reported annually to the Ministry of Education and Culture, and which are stored in the VIRTA Publication Information Service (Sīle et al., 2017; Sīle et al., 2018; Pölönen, 2018). When the dataset was downloaded in June 2019, the VIRTA data comprehensively covered outputs published in 2011–2017. The data range used in the analyses of this report is therefore mainly between 2011 and 2017 (unless otherwise stated).
- WoS: a bibliometric analysis of Finnish universities' publications based on Web of Science data
- These data consist of articles, including those of authors affiliated with Finnish universities, published in international journals indexed in the Web of Science database. Yrjö Leino from the CSC – IT Center for Science carried out a citation analysis of the Web of Science data to investigate the differences in the scientific impact of Finnish research published in journals classified at different JUFO levels.
- Panellist 2019 survey: an analysis based on data from online survey to members of the Publication Forum Expert Panels between 2010 and 2019. In 2019, the Publication Forum secretariat conducted a survey of experts who had acted as evaluators of publication channels in the Publication Forum panels between 2010 and 2019. The survey was sent to 509 panellists,

of whom 170 responded (a 33.3% response rate). The survey questions addressed the organisation and usefulness of the evaluation work, as well as the evaluation criteria and the supporting information. In addition, a smaller complementary survey was conducted among the panel chairs concerning issues related to research integrity and open access. The results of the survey as a whole are provided in Appendix 2.

2. JUFO in the international context

Summary:

Question 1. How do the logic and working of JUFO compare with international benchmarks?

Key take-aways:

- Performance-indicator-based funding models of higher education institutions, such as those currently used in Finland and other Nordic countries, have become an increasingly common type of performance-based research funding system (PRFS) in Europe, compared to peer review-based systems (such as REF in UK).
- International databases for analysing the citation impact of articles and journals, most notably Web of Science (e.g. Journal Impact Factor JIF) and Scopus (e.g. Source-Normalized Impact per Paper SNIP), remain seriously limited in their coverage of peer-reviewed publications and channels, especially in the Social Sciences and Humanities (SSH).
- The type of publication indicator developed originally in Norway, combining national publication data and a national classification of publication channels (like JUFO) can provide a comprehensive coverage and quality measurement of peer-reviewed output, with respect to all fields (also including the SSH fields), publication types (also including books), and languages (also including domestic languages).
- National biases (e.g. inflated quality levels of domestic publication channels or channels preferred by domestic scholars) are effectively reduced in systems like JUFO by selecting internationally-oriented members for evaluation panels, making regular comparisons between JUFO classifications and international rankings of publication channels, and could be further reduced by increasing collaboration between the Nordic countries in the evaluation of publication channels.
- The use of the JUFO classification for publication channels in the performance indicator-based funding model for universities (at macro level) is not inconsistent with the principles of Responsible Research quality metrics where the diversity of scholarly publishing channels and activities in different scientific fields is concerned.

In this chapter, we place the JUFO system in the international context of performance-based research funding systems (PRFS), discuss the international Web of Science and Scopus databases as publication information sources, describe the specific PRFS model introduced in Norway and its adaptations in Denmark and Finland, and consider the use of Publication Forum classification in the context of responsible metrics.

2.1. Development of performance-based funding

During the past two decades in several European countries, ministries responsible for higher education and/or science have established performance-based research funding systems (PRFS). These systems typically allocate part of annual core funding from governments to universities based on certain bibliometric indicators of research publication outputs, accompanied by other output indicators of research and higher education performance (Hicks, 2012; De Boer et al., 2015; Jonkers & Zacharewicz, 2016; Sivertsen, 2017; Zacharewicz et al., 2018; European Commission, 2018). As such, PRFSs are one of the central mechanisms through which many European Union (EU) Member States have sought to increase the effectiveness and performance of their public sector research systems in line with European Research Area (ERA) Priority 1. The efficiency of funding in terms of the capability to cost-effectively meet certain policy goals has become increasingly important.

As Sivertsen (2017) explains, countries can be divided into four categories regarding their use of bibliometrics in PRFS:

A. "The purpose of funding allocation is combined with the purpose of research evaluation. The evaluation is organized at intervals of several years and based on expert panels applying peer review. Bibliometrics may be used to inform the panels. Examples of countries in this category are: Italy, Lithuania, Portugal and the United Kingdom.
B. The funding allocation is based on a set of indicators that represent research activities. Bibliometrics is part of the set of indicators. The indicators are used annually and directly in the funding formula. Examples of countries in this category are: Croatia, the Czech Republic, Poland and Sweden.
C. As in category B, but the set of indicators represent several aspects of the universities' main aims and activities, not only research. Bibliometrics is part of the set of indicators. Examples of countries in this category are: Flanders (Belgium), Denmark, Estonia, Finland, Norway and Slovakia.
D. As in category C, but bibliometrics is not part of the set of indicators. Examples of countries in this category are Austria and the Netherlands."

As early as the 1980s, the UK established the most famous PRFS model using the peer review of individuals and their outputs to determine institutional funding. Most other countries – including Finland, Denmark, Norway, and Sweden – have chosen a different model based on indicators of institutional performances (Sivertsen, 2017; European Commission, 2019; Kivistö et al., 2019).

The UK model is unique in the sense that PRFS aims to fulfil the purpose of both funding allocation and research assessment. However, this does not mean that research in other countries is assessed only quantitatively. In countries with indicator-based PRFSs, there are other evaluation and funding procedures in which research is assessed entirely by (qualitative) peer reviewing, or via peer reviews combined with quantitative metrics. In Finland, these procedures include institutional research assessments (e.g. by the universities themselves), research project evaluation (e.g. by research funding agencies/bodies), and recruitment (e.g. by recruitment committees within universities).

2.2. Web of Science and Scopus as information sources

There are several well-established and emerging international data sources for publication data – such as Web of Science (WoS), Scopus, Google Scholar, Microsoft Academic, and Dimensions. Many of the data providers also report their own metrics that reflect publication channels' quality (e.g. Journal Impact Factor, JIF (WoS); Source-Normalized Impact per Paper, SNIP (Scopus)). However, recent large-scale analyses highlight limitations in their coverage of publication channels and thereby outputs (Martín-Martín et al., 2020; Visser, van Eck & Waltman, 2020).

Many countries and institutions still rely on the standard international databases, Web of Science (WoS) and Scopus, and their journal metrics in funding, assessment, and evaluation procedures. China exemplifies a country where WoS-based indicators, notably Journal Impact Factor (JIF), have been used at all levels and contexts of research assessment: institutional research evaluations; faculty recruitment; career promotion; individual award; university and disciplinary rankings; and funding and resource allocation (Zhang & Sivertsen, 2020). According to a recent survey, around 40% of 129 research intensive institutions in the United States and Canada mentioned JIFs in documents relating to review, promotion, and tenure processes (McKiernan et al., 2019). In Europe, 75% of 186 universities responding to the European University Association survey used JIFs to evaluate researchers in career evaluation contexts (Saenen et al., 2019).

In the fields of Science, Technology, Engineering, and Mathematics (STEM), scholarly publications are typically peer-reviewed English-language articles in international journals that are indexed in WoS and Scopus. In contrast, in the Social Sciences and Humanities (SSH), books and languages other than English remain important (Nederhof, 1989; van Leeuwen, 2016; 2013; Puuska, 2014; Sivertsen, 2016). It is therefore well established in bibliometric research that WoS and Scopus cover only a relatively small share of all peer-reviewed publications and their channels, and that there is considerable variation in their representation of research produced in different fields and countries (Nederhof et al., 1989; Hicks, 1999; Nederhof, 2006; Archambault

et al., 2006; Larivière & Macaluso, 2011; Hicks & Wang, 2011; Sivertsen & Larsen, 2012; Ossenblok et al., 2012; Sivertsen, 2016; Giménez-Toledo et al., 2017; Kulczycki et al., 2018; Aksnes & Sivertsen, 2019; Kulczycki et al., 2020).

In the case of Finnish universities' peer-reviewed publications, the WoS and Scopus coverage increased between 2011 and 2017 (Figure 2.1). Nevertheless, the WoS and Scopus coverage still remains seriously limited. In 2017, 75% of the peer-reviewed publications in STEM fields were covered in WoS, and 79% in Scopus. However, in SSH fields, WoS and Scopus covered only 35% and 38% of the peer-reviewed output respectively. Hence, although WoS and Scopus publication and citations have a relatively high degree of legitimacy as indicators of research performance in STEM fields, they provide a very limited picture of research performance in other fields like SSH. Consequently, if a PRFS were based only on WoS or Scopus based publication counts and citation scores, the publication outputs, especially from the SSH fields, would be seriously underestimated in the system.

2.3. The Norwegian model of publication indicator

In 2005, Norway introduced a performance-based research funding system (PRFS) based on a fixed funding formula. As part of PRFS, the research publication outputs of each university (regardless of field) are weighted according to a quality rating of journals/series and book publishers derived from a comprehensive rating of publication channels by experts. Denmark and Finland later also adopted the Norwegian model, in 2009 and 2012–2015 respectively (Schneider, 2009; Sivertsen, 2010; 20186b; Bruun-Jensen, 2011). However, since 2009, Sweden has continued to apply an indicator based on Web of Science publications and citations (Sīle & Vanderstraeten, 2018).

The Norwegian model has three components (Sivertsen, 2017, 2018):

A. A complete representation in a national database of structured, verifiable, and validated bibliographical records of the peer-reviewed scholarly literature in all areas of research;

B. A publication indicator with a system of weights that makes field-specific publishing traditions comparable across fields in the measurement of "publication points" at the level of institutions;

C. A performance-based funding model, which reallocates a small proportion of the annual direct institutional funding according to the institutions' shares in the total number of publication points.

The Norwegian model addresses the problem of the limited publication coverage of international systems such as WoS and Scopus by collecting comprehensive output data directly from research institutions to provide a complete coverage of publications across all fields, publication types, and languages. Universities annually report their complete bibliographic record of publications to the government as part of the performance-based research funding systems (Hicks, 2012; Sīle et al., 2017, 2018; Giménez-Toledo et al., 2016, 2017, 2019). The national bibliographic database either substitutes the universities' local Current Research Information Systems (CRIS), as in Norway, or integrates publication data from the local CRIS, as in the Finnish VIRTA Publication Information Service (Sivertsen, 2016b, 2018; Aagaard, 2018; Pölönen, 2018a; Engels & Guns, 2018; Kulczycki & Korytkowski, 2018; Puuska et al., 2020).
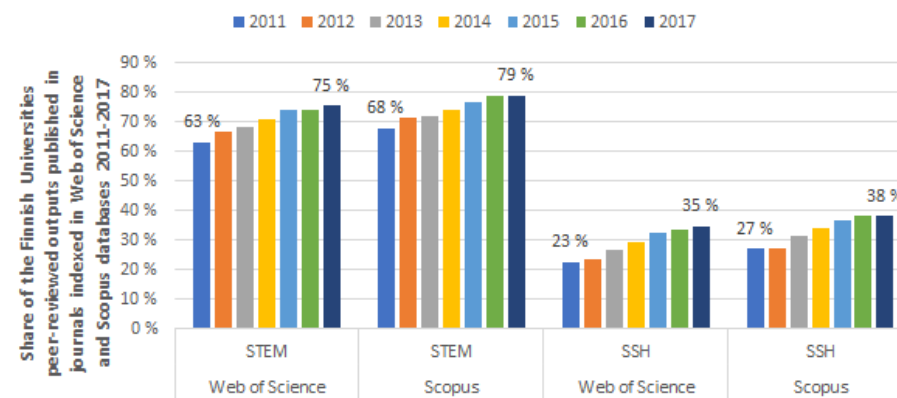

Figure 2.1. While the share of Web of Science and Scopus indexed publications of Finnish universities increased in 2011–2017, the share remains low in the fields of Social Sciences and Humanities (SSH). Total number of publications: 184,105. Source: VIRTA Publication Information Service.

PRFSs using undifferentiated counts of publications, such as those established in Australia in 1993, risk promoting quantity at the expense of quality (Butler, 2003; 2004; Schneider et al., 2015; van den Besselaar et al., 2017; Aagaard & Schneider, 2017). In Norway, a national classification of publication channels is used to make publishing in channels with the higher average quality more rewarding for the universities (Norwegian Association of Higher Education Institutions, 2004). In Norway, where the funding model is based on quality differentiated publication counts, the quantity of publishing has not increased at the expense of quality (Butler 2004; Schneider et al. 2015). There are also indications from Denmark and Finland that PRFSs based on the Norwegian model may be associated with increased productivity in both quantity and quality (Ingwersen & Larsen, 2014; Ministry of Education and Culture, 2016; Seuri & Vartiainen, 2018).

2.4. National lists of publication channels in Norway, Denmark, and Finland

In their current PFRSs, Norway, Denmark, and Finland use 3–4 levels or categories to differentiate the basic peer-reviewed (e.g. Finland's JUFO level 1) and leading publication channels (JUFO levels 2, 3) according to their average quality, impact, and/or prestige. Some lists also identify non-approved publication channels (JUFO level 0). The assignment of channels to levels is based on expert evaluation, which is informed but not determined by journal metrics (e.g. Journal Impact Factors JIF) whenever available (Sivertsen, 2016b; 2017; 2018b; Aagaard, 2018; Pölönen, 2018a; Pölönen et al., 2020a; for Poland, see Kulczycki & Rozkosz, 2017). The fact that the panels are informed by, and regularly compare their ratings with, various international rankings and metrics reduces national biases in the resulting classifications (e.g. overestimated quality levels of domestic publication channels or channels preferred by domestic scholars). Moreover, the panel members are often researchers who are internationally oriented and have themselves published in publication channels of higher international quality, impact, and prestige.

Overall, the construction and maintenance of the publication channel lists is organised in a similar way, and on a similar scale, in Denmark, Finland, and Norway (Table 2.1). The number of full-time personnel operating the secretariat coordinating the evaluation of channels is quite similar in all three countries. However, the JUFO system in Finland has a somewhat smaller number of expert evaluators than those in Norway and Denmark. The evaluation task is also organised in different numbers of field-specific panels, ranging between 23 in Finland and 89 in Norway. The number of channels registered ranges between 21,596 in Denmark to 32,223 in Finland, and 35,861 in Norway. The number of channels is smaller in Denmark, because channels not approved for level 1 are not registered at level 0, as in Finland and Norway (organisational differences are further discussed in Chapters 3.2 and 3.3).

- Finland: The Publication Forum list of journals/series and book publishers is produced by the Federation of Finnish Learned Societies, while the CSC – IT Centre for Science is responsible for the technical maintenance of the database containing the register of publication channels. The 23 field-specific panels were established by the Federation of Finnish Learned Societies in 2010 for the sole purpose of publication channel evaluation for JUFO (Auranen & Pölönen, 2012; Pölönen & Ruth, 2015; Pölönen, 2018a).
- Denmark: The list of series and book publishers to support the Bibliometric Research Indicator (BFI) is administered by the Ministry of Higher Education and Science on the basis of recommendations from 67 Expert Panels composed of researchers appointed by Universities Denmark. The recommendations are managed and finally decided by an Academic Committee representing all eight universities and their major areas of research (Sivertsen & Schneider, 2012; Aagaard, 2018).
- Norway: The Norwegian Register for Scientific Journals, Series, and Publishers is managed by The National Board of Scholarly Publishing (NPU) and operated by the Norwegian Centre for Research Data (NSD). The 86 expert groups are largely based on pre-existing national academic bodies established by Universities Norway (UHR) for professional and administrative development.

Table 2.1. Organisation of the evaluation of publication channel lists in Denmark, Finland, and Norway

	Finland	Denmark	Norway
Established	2010	2009	2005
Full-time personnel	2	2.5-1	2
Panels	23	67	89
Experts	250	429	331
Publication channels	32,223	21,596	35,861
Levels	4 (0, 1, 2, 3)	3 (1, 2, 3)	3 (0, 1, 2)

The secretariats in Norway, Denmark, and Finland have a well-established collaboration for sharing information on the good practices and challenges related to the management and evaluation of publication channels. In 2016–2017, Nordforsk funded a Nordic list project to integrate bibliographic and bibliometric data from the Danish, Finnish, and Norwegian publication channel lists into a common Nordic registry. The aim – thus far only partly realised – is to reduce and share the workload of maintaining the channel data, and to improve the data quality and sharing of level information. A fully integrated Nordic research information service would include both the national channel lists and publication output data, which could facilitate a comparison of channel ratings and research output between Nordic countries and institutions across all scientific fields (Sivertsen, 2016b; 2019; Puuska et al., 2020).

In 2016, the JUFO Steering Group proposed that in addition to data collection, the Nordic collaboration could also aim to increase collaboration regarding the level ratings between the Nordic countries. One possible aim could be to increase uniformity between the national ratings, because many channels are as-signed differently to levels 1 or 2 in Denmark, Finland, and Norway. Three possible stages have been identified for such collaboration (Pölönen & Sivertsen, 2017):

1. Sharing of level ratings. The Expert Panels in Denmark, Finland, and Norway are already now informed of the level ratings of journals/series and book publishers in the other Nordic countries.

2. Integrating separate national ratings. An integrated Nordic rating could be produced using automated rules combining the level ratings from Denmark, Finland, and Norway.

3. Common Nordic panels. A common Nordic level rating could also be achieved by organising evaluation panels with experts from all the Nordic countries.

The advantage with stages 2 and 3 above is that the evaluation of publication channels and their nominations to levels 2 and 3 would be based on a larger pool of expertise from the Nordic countries (given the Nordic countries' small size, the national research communities are also relatively small). The main challenges would lie in overcoming policy differences between countries in level and panel structures, organising effective coordination of Nordic collaboration, taking care of the publication channels in national languages, and meeting the needs of each country's somewhat different national PRFS.

2.5. National publication channel lists and responsible metrics

In 2013, the San Francisco Declaration on Research Assessment (2012; https://sfdora.org) highlighted the need to assess research on its own merits rather than on the basis of the journal in which the research is published: "Do not use journal-based metrics, such as Journal Impact Factors, as a surrogate measure of the quality of individual research articles, to assess an individual scientist's contributions, or in hiring, promotion, or funding decisions." The Leiden manifesto for research metrics also promotes more responsible use of quantitative indicators in research evaluation (Hicks et al., 2015; de Rijcke et al., 2016). This trend has recently been expressed in China, where a research evaluation and funding reform indicates a shift from the narrow focus on WoS-indexed papers and Journal Impact Factor (Zhang & Sivertsen, 2020).

The use of a national list of publication channels in the funding model partly contradicts the DORA Declaration in the sense that journals and book publishers are employed as a proxy for the quality of outputs published in them. However, in the Norwegian model, the unit of assessment is not the individual researcher but the entire output of universities. The national publication channel ratings in Denmark, Finland, and Norway are based on expert assessment, not the Journal Impact Factor. In addition, the Norwegian model promotes the DORA Declaration's other important recommendations, according to which it is important to take the diversity of outputs into account in research assessment and base the indicators on transparent data.

Furthermore, being integrated with comprehensive national publication data, the JUFO system is consonant with the main principles of responsible metrics outlined in the Metric Tide report, for example (Wilsdon et al., 2015; Publication Forum, 2020):

- Robustness: basing metrics on the best possible data in terms of accuracy and scope;
- Humility: recognising that quantitative evaluation should support – but not supplant – qualitative, expert assessment;

- Transparency: keeping data collection and analytical processes open and transparent so that those being evaluated can test and verify the results;
- Diversity: accounting for variation by field, and using a range of indicators to reflect and support a plurality of research and researcher career paths across the system;
- Reflexivity: recognising and anticipating the systemic and potential effects of indicators, and updating them in response.

In the funding model of the Ministry of Education and Culture in Finland, the assessment focuses on more than 25,000 peer-reviewed publications produced annually. A publication-specific expert evaluation of these (i.e. having experts assess the quality of each of the 25,000 publications separately) would constitute an insurmountable amount of work. It is also important to distinguish between the use of journal metrics or other channel-based indicators at the aggregate level (e.g. to evaluate the average quality of the large number of publications produced by the organisation) versus using such indicators at the level of individual publications or individual researchers (Verleysen & Rousseau, 2017; Moed, 2020). As the purpose of the JUFO classification reflects the former not the latter, it can be concluded that no serious contradiction exists between international principles of Responsible Research quality metrics and the JUFO system. To promote responsible assessment at the individual level, Norway and Finland have published guidelines for the responsible use of national publication channel-based indicators (Sivertsen, 2018; Pölönen, 2018a; JUFO, 2020).

3. Administration and organisation of JUFO evaluations

Summary

Question 2. Are JUFO procedures organised effectively?

Key take-aways:

- A survey of JUFO's expert panellists shows that the panellists view their panel membership as for a valuable personal experience and a meaningful service for the research community. Overall, there is a high-level of satisfaction with the work of the panel, secretariat, and Steering Group.
- JUFO maintains a comprehensive list of publication channels, with fewer panellists than Denmark and Norway. Thereby, the average amount of evaluation work per individual panellist is likely higher in Finland than it is in Denmark or Norway.
- The JUFO Steering Group has taken measures to distribute the evaluation work more equally between panellists, but the panel chairs continue to have a larger workload than the panellists. It is possible to further decrease the panellists' workload by shifting some of the work to the JUFO secretariat, and improving the tools and information supporting the panellists' expert work.
- It is unclear if it is more demanding from the perspective of panellist workload to review publications channels on JUFO levels 2 and 3 incrementally on an annual basis, as in Norway, or to organise a larger review every 4 years, as in Finland currently.
- The JUFO portal is perceived as a valuable tool for the JUFO secretariat and panel members, and it provides information on publication channels to the research community. The JUFO portal's data supporting assessment needs to be updated for timeliness and accuracy.

- The funds for the JUFO portal, allocated annually to CSC by the Ministry of Education and Culture, are principally used for the maintenance of the JUFO portal, which delays the development of new functionalities that benefit the JUFO panellists and the scientific community.
- Given the amount of annual funding allocated by the Ministry of Education and Culture to universities based on JUFO levels, the JUFO system is a very cost-effective way of organising the overall quality assessment of universities' publication performance.

In this chapter, we describe the organisation of the JUFO Steering Group, secretariat, and expert panellists, and compare the organisation of evaluation work with equivalent organisations in Denmark and Norway. We also describe the IT services needed and produced in collaboration with CSC, as well as the participation of stakeholders in the operation of the JUFO system.

3.1. Steering Group

The tasks of the JUFO Steering Group are to outline and monitor objectives for the maintenance, development, and evaluation of the JUFO system, keep the background organisations and communities (represented by the Steering Group members) up-to-date about the JUFO classifications, and appoint new panels and panellists at the end of the previous panels' mandate. However, there is a clear distinction between the duties of the Steering Group and the Expert Panels. The former provides the overall criteria and framework for the evaluation which concern all panels, while the latter are responsible for the evaluation of individual publication channels. The decisions of the panels cannot be appealed to the Steering Group. In the online survey of JUFO panellists, the majority of respondents indicated a high or very high level of satisfaction with the work of the Steering Group (68%) (Appendix 2, Figure 37). Overall, there has been no indication of concerns or proposals for improvements regarding the organisation of the Steering Group.

The JUFO Steering Group is a broad-based forum, consisting of seven representatives of different science policy and research organisations, as well as four to five members of the research community. It is appointed for a four-year term by the Board of Directors of the Federation of Finnish Learned Societies, based on the proposals from the following organisations and research communities.

1. The Federation of Finnish Learned Societies itself, the Ministry of Education and Culture, the Finnish Council of University Rectors (Universities Finland), the Academy of Finland (the major national research funding agency), the Finnish University Libraries' Network (FUN), the National Library of Finland, and the IT Centre for Science (CSC) nominate their own representatives.
2. The Federation of Finnish Learned Societies' member societies, including four Finnish science academies and more than 280 learned societies, proposes experts to represent the various main fields.

The chair of the JUFO Steering Group is the current or former chair of the Federation of Finnish Learned Societies' Board of Directors, while the representative of Universities Finland (i.e. a vice rector of research from one of the Finnish universities) has acted as vice chair. The work of the Steering Group is supported by the JUFO secretariat, including two full-time employees from the Federation of Finnish Learned Societies, and two additional representatives from the Federation of Finnish Learned Societies and Universities Finland. The Steering Group typically meets face to face three to four times a year in facilities offered by the Federation of Finnish Learned Societies at the House of Science and Letters in Helsinki. The meetings are scheduled, organised, and prepared by the JUFO secretariat. The organisations the Steering Group members represent reimburse any travel and accommodation expenses.

There is a clear distinction of duties between the Steering Group and the Ministry of Education and Culture with regard to the design of the publication indicator used in the funding model for universities (Pölönen, 2018a). The Steering Group is responsible for the production of the national list of publication channels with JUFO levels, while the Ministry periodically constitutes working groups who decide how the JUFO levels are used in the model for allocating government funding for universities. A funding model proposal is typically published in a report and sent out for consultation to stakeholders. Since 2012, the new model has been approved for four-year periods, and the decree concerning the universities' core funding criteria is amended accordingly.

The development of the JUFO system has been entrusted to the research community, which is broadly represented in the JUFO Steering Group and the Expert Panels. Consequently, while the Ministry has provided basic resources to the Federation of Finnish Learned Societies to enable the operation of JUFO, the Steering Group has been autonomous in establishing and developing the JUFO system. The Steering Group has introduced changes to the number of JUFO levels, the methods for calculating the level quotas, and the evaluation criteria (these are discussed further in Chapter 4). As the JUFO system affects the distribution of funding between universities, any major changes have been introduced in a dialogue with the Ministry and the universities. The Steering Group is also autonomous vis-à-vis the Board of Directors of the Federation of Finnish Learned Societies. However, the board is informed of major decisions regarding evaluations or panels.

3.1.1. Guiding principles and policy goals

The main principles guiding the Steering Group's work are scientific quality and equality between fields. These principles arise directly from the JUFO system's purpose to support the universities' funding model by providing a classification of publication channels, according to which the quality of universities' publication output can be adequately taken into account in the Ministry's funding model. This task is based on a widely shared underlying presumption that scientific publication channels differ on the basis of the average scientific quality, impact, and significance of the research they publish. The JUFO classification serves the purpose of supporting the Ministry's funding model by constituting representative field-specific Expert Panels for identifying peer-reviewed journals/series, conferences, and book publishers (JUFO level 1), and by indicating those that are most highly appreciated and influential among the scientific community (JUFO levels 2 and 3). In addition to quantity, the added value of the JUFO

system is to promote quality by encouraging the scientific community in Finland to strive for quality and impact, i.e. publishing research results in publication channels that are valued by the scientific community, are demanding in terms of peer reviews, and reach the widest critical expert audience. Because the universities have different disciplinary profiles, the access to higher JUFO level publication channels ought to be fairly equal across the various main fields. The balance between fields is achieved by limiting JUFO levels 2 and 3 nominations so that the level 2 and 3 journals/series publish about the same share of the total world output in each panel.

While developing the JUFO system to serve the Ministry's funding model according to the principles of scientific quality and equality between fields, the Steering Group also needs to consider a variety of potentially conflicting science policy goals. One of the leading science policy goals in Finland and globally has been the internationalisation of research, personnel, and education, whereby international excellence represents the standard of research quality. More recently, other policies – notably Responsible Research and innovation (RRI) – have emphasised the importance of the societal impact and interaction of research. During the past five years, especially in Europe, science policy goals have been strongly shaped by the open science agenda, which has also seriously challenged the traditional notion of research quality and excellence. Most importantly, science policies have widely adopted the open science goal of free, immediate, and unrestricted online access to peer-reviewed publications as a means to accelerate the societal benefits of research. In Finland, the research community is now widely committed to a national policy, according to which "no later than 2022, all new scientific articles and conference publications will be immediately openly accessible".

Internationalisation and societal impact agendas pose two specific challenges to the JUFO system: how to legitimise and harmonise the national classification of publication channels in relation to international standards of quality; and how to value Finnish peer-reviewed journals and book publishers in relation to international publication channels. While the Expert Panels consist of researchers affiliated with Finnish universities and research institutions, the experts base their analysis of publication channels above all on the international appreciation and impact of the publication

channels among the global scientific community. In this task, the panels are supported by a suite of international journal metrics and quality classifications. Publication channels publishing in Finland's official languages (Finnish and Swedish) can also be identified to represent the highest quality, especially in the fields of Social Sciences and Humanities, where the publication channels can be seen to represent the highest international standard due to the Finnish context of the research subject.

The main challenge of the JUFO system with regard to open science policies is that the most highly esteemed peer-reviewed journals and book publishers do not always provide free, immediate, and unrestricted open access to research publications, or do so at a very high cost to researchers, research institutions and funders (Ikonen, 2018; Pölönen, 2018b; Ilva, 2020). A considerable divide has emerged between the well-established subscription-based publication channels with highly selective editorial and peer review procedures that are seemingly free for researchers to publish, and relatively new open access (OA) publication channels often associated with faster and less selective quality control procedures, where researchers pay an article processing charge (APC) to get published. While some OA journals have rapidly gained reputation and impact as leading channels in their field, at the other end of the spectrum a range of questionable or predatory journals has emerged that publish papers to gain an APC without proper peer review to control and contribute to quality. As the JUFO-level criteria tend to be favourable to subscription-based journals, there is a potential conflict between policies promoting quality and OA publishing.

In the JUFO system, as in the national open access policy, the seeming conflict between research quality and OA policies is managed according to a principle that the quality and openness of publication channels and individual research publications are considered independently (Open Science Coordination, 2020). In the JUFO system, openness is not a criterion or indicator in the evaluation of the scientific quality of publication channels. However, open access is seen to improve the accessibility of publications and consequently, the potential to maximise their scientific and societal impact. The Expert Panels at the highest JUFO levels 2 and 3 can thus favour a directly open access channel or one allowing self-archiving of a peer-reviewed version of

a manuscript if this channel is seen as an equal alternative in scientific quality compared to a channel representing the same discipline which does not allow equally open access. The potential conflict is also mitigated by the fact that from 2021, the Ministry's funding model for universities will reward publications based on both quality (JUFO levels) and open access (giving OA outputs an additional weighting of 20%), thereby simultaneously promoting both the quality and open access of publications (Ministry of Education and Culture, 2018).

Finally, while the Steering Group develops the JUFO system principally for the purpose of the Ministry's funding model for universities, it also needs to increasingly address other uses of the JUFO levels in the research community. These other uses include the Finnish universities' internal funding models and research assessments using external Expert Panels, as also foreseen by the Universities Finland working-group (Universities Finland 2010). In addition, JUFO levels have also been used as evidence supporting evaluations regarding the recruitment, tenure-track, performance, and rewards of individual researchers. JUFO levels are designed to be used at the macro level to evaluate and compare the entire output of universities, and they may be especially unsuitable for the assessment of individual researchers (the various uses are further discussed in Chapter 5). This is because the evaluation of the scientific quality, impact, and significance of publication channels is based on the idea of the average quality and impact of the articles and monographs published on these channels. However, an individual publication can represent a higher or lower level of quality, impact, or significance than the publications on a publication channel do on average. The Steering Group has addressed these concerns since 2012 by publishing user guidelines for the responsible use of the JUFO classification.

3.1.2. New services for the Finnish research community

In developing the JUFO system, the Steering Group also needs to consider that JUFO contributes to national science policy goals by performing tasks that are beyond its primary function to produce the quality classification of publication channels. In 2014, JUFO actively participated in the development of the Federation of Finnish Learned Societies label for peer-reviewed scholarly publications, by which Finnish

scholarly publishers indicate books and articles that have undergone peer review (Pölönen, 2018a; Kulczycki et al., 2019). The label is independent of the JUFO levels; however, it supports the data collection process by helping researchers and other involved personnel identify registered peer-reviewed monographs and articles. The National Board of Research Integrity may also request documentation from publishers in the event of misconduct investigations. The label has gained wide use among Finnish scholarly publishers: currently, more than 200 journals/series and book publishers are registered users. The JUFO secretariat currently administers the rights to use the label, and a scholarly publisher violating the terms and conditions risks losing the right, based on a decision of the JUFO Steering Group.

Since 2018, the Federation of Finnish Learned Societies has hosted the national office of Open Science Coordination. JUFO contributes to the coordination by providing the secretariat for the Expert Panel in Culture for Open Scholarship. It has also been agreed that the JUFO Expert Panels can act as field-specific expert groups in open science-related questions. JUFO is also set to play a new role in ensuring the realisation and monitoring of the strategic principles of the *Open Access to Scholarly Publications. National Policy and executive plan by the research community in Finland for 2020–2025* (Open Science Coordination, 2020). Principle 3 states that "when assessing scholarly publications, the quality and openness of individual research publications are considered independently". The national policy indicates the need for "coordination of a regular review of how open access to publications is taken into account in the systems for evaluating researchers at higher education institutions and research organisations". Concerning JUFO, the national policy states: "The Publication Forum will monitor the open access publication channels and impact of open access on the average level of quality of the publication channels." JUFO is indeed well placed to conduct this type of monitoring, because it maintains a JUFO register containing all publication channels used by the researchers affiliated with the Finnish research performing organisations.

JUFO also contributes to the national open science goals by developing the information about the OA policies of publication channels in the JUFO register, as well as JUFO portal services to help Finnish researchers identify and utilise the opportu-

nities for open access publishing. The JUFO portal currently provides information on the open access (OA) status (DOAJ and Bielefeld lists) and self-archiving policies (Sherpa Romeo) of the journals the JUFO register includes. The JUFO portal could be developed, in collaboration with the National Library and the Academy of Finland, to provide more extensive OA information, including easy discovery of journals in which the Finnish researchers can publish OA free of charge or with a discount under the FinELib consortium's publisher agreements, as well as journals in which they can publish in compliance with the OA requirements of national and international research funders (e.g. Plan S). JUFO also contributes to the Federation of Finnish Learned Societies' strategic goal of "developing open scientific publication of its member organisations" by facilitating the indexing of Finnish journals in the Directory of Open Access Journals (DOAJ).

Summary:

- The JUFO Steering Group has a comprehensive representation of science policy and research organisations, and there have been no indications of concerns or proposals for improvements regarding the organisation of the Steering Group.
- The main principles guiding the Steering Group's work relate to safeguarding scientific quality and equality between fields. The Steering Group develops the JUFO system in an environment of partially conflicting policy goals, demands, and uses of the JUFO levels, and takes into account a wider range of potential contributions of JUFO system to the Finnish research community (e.g. national scholarly publishing and open science).

3.2. Secretariat

The Federation of Finnish Learned Societies employs two full-time persons for the operation of the Publication Forum. They are responsible for developing, preparing, and coordinating the evaluation of academic publication channels in collaboration with the Steering Group and the Expert Panels.

The main tasks of the secretariat include:

1. Operation and development of the JUFO classification, including coordination and support for the Steering Group.
2. Coordination of the evaluation of publication channels by 23 Expert Panels, including the preparation of lists of publication channels for evaluation, and the organisation of the evaluation work and meetings of 250 panellists.
3. Annual identification of publication channels and JUFO levels for nearly 5,000 peer-reviewed outputs in the VIRTA Publication Information Service for which automated identification is not successful.
4. The maintenance, updating, and enriching of the bibliographic and bibliometric information of more than 32,000 publication channels in the JUFO register, including open access information.
5. Communication and counselling about JUFO levels, including the development of the JUFO website, as well as social media and news media communications.
6. Development of the IT services related to JUFO, in collaboration with CSC, including the JUFO register of publication channels, as well as JUFO portal interfaces for the panellists and the public.

Additionally, the JUFO secretariat regularly engages in activities supporting its main tasks:

7. Administration of the Federation of Finnish Learned Societies label for peer-reviewed publication channels, including support for the Steering Group, and processing applications from publication series and book publishers.

8. Participation in national and international Expert Groups and networks related to infrastructures, information systems, open science, scholarly publishing, and responsible researcher evaluation.
9. International collaboration supporting the evaluation of publication channels, including sharing of best practice with Nordic and other countries, and the development of international information sources.
10. Conduct of analyses and publishing presentations, reports, and peer-reviewed research concerning scholarly publishing, including publication channels, information sources, and evaluation methods.
11. Promotion of responsible evaluation culture, including comprehensive and open information sources, as well as bibliodiversity and multilingualism at national and international levels.
12. Contribution to the Federation of Finnish Learned Societies' strategic goals, including strengthening learned societies and advancing open access publishing, open science, national scholarly publishing, and Responsible Research.

Strong support from the secretariat decreases the workload of the experts in JUFO panels. The JUFO secretariat provides the Expert Panels with extensive centralised support, preparing all the materials for evaluation, scheduling the evaluation work, as well as organising and supporting all the panel meetings. As in Denmark and Norway, there is also a strong effort to develop technical facilities to support the experts' evaluation work, notably the JUFO portal, in collaboration with CSC. The support for experts is somewhat more straightforward to manage in Finland than in the benchmark countries Denmark and Norway, because there are only 23 panels in Finland, compared to 67 panels in Denmark and 89 panels in Norway. Yet the continuous coordination and facilitation of the evaluation work of nearly 250 experts throughout the year is also a demanding task for the JUFO secretariat in Finland. In the online survey for the JUFO panellists, the vast majority of respondents indicated a high or very high level of satisfaction with the work of the secretariat (94%) (Appendix 2, Figure 37).

3.2.1. Management of publication channels

The number of evaluated publication channels is also a factor in the workload of the JUFO secretariat and experts. The growing number of publication channels in the JUFO register has made maintaining and updating the data increasingly demanding. By 2019, the number of publication channels had increased by 51% since the first JUFO levels were published in 2012, amounting currently to more than 32,000 journals/series and book publishers (Figure 3.1). Since 2012, more than 10,000 journals/series and book publishers have been added to the JUFO register, of which 41% have been approved for at least JUFO level 1, and 59% have been assigned to JUFO level 0. The number of new channels added annually was more than 2,000 during 2013–2014, and has remained between 1,200 and 1,400 a year since 2015 (Figure 3.2). The production and updating of part of the information is automated from national and international information sources. However, the maintenance of a large variety of data also demands manual work from the JUFO secretariat (Appendix 1, Table 3). Furthermore, the diversity and complexity of the required information is increasing (e.g. open access status and predatory journals).

Although the number of panels is lower in Finland than in Denmark and Norway, the workload *per panel* for both the secretariat and the expert panellists is larger in Finland than in Denmark and Norway. This is due to three key differences in the organisation of the evaluation of publication channels, as summarised in Table 3.1. below.

Table 3.1. Differences in the evaluation practices of publication channels in the three countries imply that the workload per evaluation panel(list) is higher in Finland than in Denmark or Norway

	Finland	Denmark	Norway
1. New channels are identified based on publication data	Yes	No	No
2. Level 0 publication channels are registered	Yes	No	Yes
3. Unused channels are not excluded from the register	Yes	No	Yes

Concerning (1), the identification of new channels, there are substantial differences in the systems of the three Nordic countries with regard to sources from which new publication channels are identified for evaluation. In Finland, it is the task of the JUFO secretariat to identify new channels for evaluation annually from two sources: (a) suggestions made by the members of the research community; and (b) data from the VIRTA Publication Information Service.

Concerning (a), suggestions from the research community, members of the research community in Finland, as in Norway and Denmark, can suggest the addition of journals/series and book publishers to level 1. Yet concerning (b), the VIRTA Publication Information Service, new publication channels have also been identified systematically in Finland since 2012, based on national VIRTA publication data (which is also used as the basis of the PRFS publication indicator). In the Danish and Norwegian systems, national publication data are not used in this way to identify new channels for the system. In practice, Finnish research organisations – including universities, universities of applied sciences, public research institutes, and hospital districts – report metadata of around 28,500 peer-reviewed publications annually to VIRTA. In the case of approximately 5,000 peer-reviewed publications (17.5%), the automated identification of publication channels in VIRTA is unsuccessful. In these cases, the channels are identified manually by the JUFO secretariat, based on the VIRTA data. Publication channels that have not been previously evaluated are then added to the JUFO register and assigned to panels for evaluation.

The aforementioned (b) identification of new publication channels based on the VIRTA data ensures the complete coverage of publication channels used by the Finnish researchers in the JUFO system. Nevertheless, this also means that a larger number of publication channels is processed by the secretariat and evaluated by the panels annually for inclusion in level 1 in Finland than in Norway and Denmark. It can be estimated that of all new channels added to the JUFO register in 2019, roughly 35% were based on (a) suggestions from the research community, while 65% were identified from (b) the VIRTA publication data.

Concerning (2), level 0 publication channels, which have not been approved by experts for level 1, there are also differences between the Nordic systems. In Fin-

land and Norway, level 0 publication channels are included in the register, while in Denmark, only channels approved at least to level 1 are maintained in the register. Registering level 0 channels has the advantage of providing complete coverage of publication channels, and helps to avoid the additional work of registering the same channels again for evaluation if they are later suggested again by researchers or identified from the VIRTA data. The disadvantage is the growth of the register with channels that have not been approved (yet) for JUFO level 1. This means a significant added workload for the JUFO secretariat regarding the bibliographic and bibliometric information for the publication channels in the JUFO register, especially as many of the level 0 journals and book publishers are not covered in the national and international information sources, and their maintenance, updating, and enriching therefore requires manual work.

Concerning (3), exclusion of channels, the total number of publication channels at levels 1, 2, and 3 is smaller in Finland (24,800) than in Norway (28,900), and larger than in Denmark (21,600). The smaller number of channels in Denmark is partly due to an effort to exclude from the register less relevant or marginal publication channels in which Danish researchers have not published anything during the past 5 years. Such channels are not automatically excluded, but the panels need to give reasons for not removing them. Although the level 2 and 3 channels in Finland are reviewed every four years, there is a need to maintain and update data about all the channels in the register.

Summary:

- Operations to support expert evaluation are more time and effort consuming in Finland than in Denmark and Norway because of more comprehensive evaluation of various publication channels in the Finnish system.
- The number of publication channels in the JUFO register for which it is necessary to manage and update the bibliographic and bibliometric information is also constantly increasing.
- According to the survey conducted in 2019, the JUFO panellists are highly satisfied with the work of the JUFO secretariat.

3.3. Expert Panels

The evaluation of publication channels is the main task of the nearly 250 experts in the 23 field-specific panels. The underlying idea in establishing the panels is that publication channels can be sensibly evaluated only by experts who understand the publishing practices and have experience of the range of publication channels used in the given field.

Every year, the experts in the JUFO panels evaluate new channels to be added to the JUFO level 1 (disapproved channels are assigned to level 0). Practically all evaluation work is performed remotely online in the JUFO portal established in 2014 to facilitate the Expert Panels' work. During the first year of their four-year term, the experts carry out both the evaluation of new channels (JUFO levels 1 and 0) and a comprehensive review of all channels at JUFO levels 2 and 3. This work is done only partly in the JUFO portal, and involves between two and four face to face panel meetings organised during the year in Helsinki at the House of Sciences and Letters operated by the Federation of Finnish Learned Societies. In addition, the chairs of all Social Sciences and Humanities panels meet during the year to review channels publishing in the national languages (Finnish and Swedish) at the JUFO level 2 and to prepare a preliminary proposal regarding the book publishers at JUFO levels 2 and 3. At the end of the first year, the chairs of all panels meet to approve the panels' suggestions regarding journals/series for JUFO level 3 and the Social Sciences and Humanities panel chairs' proposal regarding the book publishers for JUFO levels 2 and 3.

Overall, the experts are motivated to contribute to the evaluation of publication channels and consider the work in JUFO panels as useful for them both personally and for the academic community. In the 2019 panellist survey, 75% of the respondents indicated they experienced the work in the Expert Panel as fairly or very useful concerning personal learning and experience, and serving research community (Appendix 2, Figure 39). Moreover, prior to their appointment, all the current panellists (term 2018–2021) have expressed a high motivation in being JUFO panel members. In the panellist survey, the current panellists consistently considered the panel work even more satisfying and useful than the previous panellists (2010–2017). The vast majority of respondents (84%) also indicated a high or very high level of overall satis-
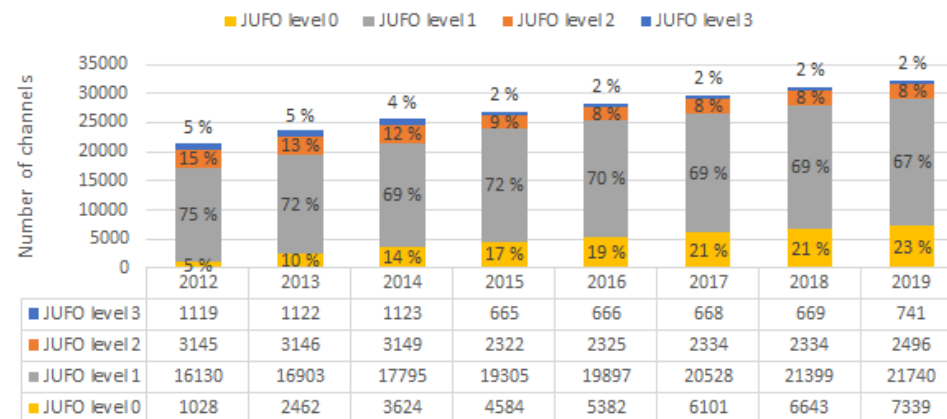

	2012	2013	2014	2015	2016	2017	2018	2019
JUFO level 3	1119	1122	1123	665	666	668	669	741
JUFO level 2	3145	3146	3149	2322	2325	2334	2334	2496
JUFO level 1	16130	16903	17795	19305	19897	20528	21399	21740
JUFO level 0	1028	2462	3624	4584	5382	6101	6643	7339

Figure 3.1. The number of publication channels in the JUFO register has increased substantially over the years. In 2015, the number of channels at JUFO levels 2 and 3 decreased, in part, due to a change in the methodology for calculating level quotas for panels. Source: Publication Forum.
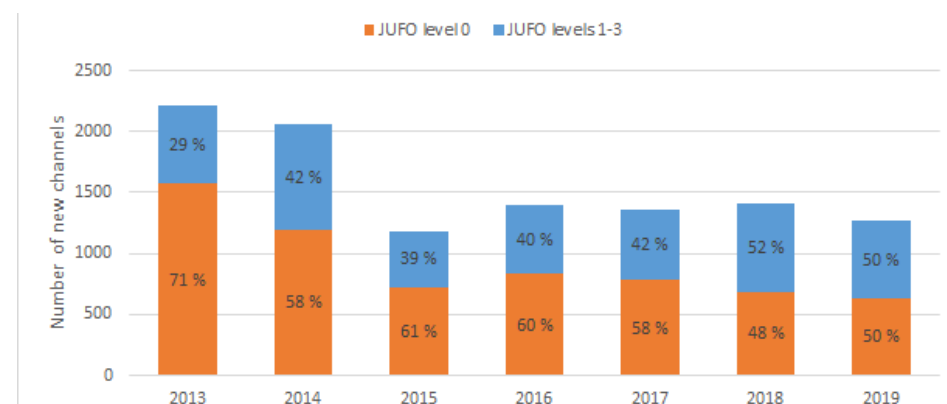

Figure 3.2. More than a thousand new publication channels have been added to the JUFO register per year. Source: Publication Forum.

faction with the work of their panel. There appears to be no urgent need to increase the number of experts in the panels, because 85% of respondents answered that the number of experts in their panel was adequate (Appendix 2, Figure 2).

3.3.1. Organisation of JUFO panels

The panellists are nominated for a four-year term by the Steering Group on the basis of proposals made by universities, public research institutes, learned societies, and science academies. In appointing the panellists, the Steering Group's main objective is to ensure that the expertise of the panels covers all the research fields for which they are responsible. The panellists are required to have extensive experience of research, scholarly publishing, and research evaluation. Attention is also paid to fair gender and career-stage representation, and to a balanced representation of various research organisations in the panels. Panel members represent the national research community in their own discipline or research area, and they are also expected to consult members of the research community outside the panels. When new panels are nominated every four years, the aim is to have both continuity and change in the panel compositions, including members from the previous term(s) and new members. The panels can propose the addition of (a) new expert(s) to the Steering Group if there is no sufficient expertise among the current members, or a member needs to leave the panel work during the four-year term.

The expert panellists are not paid for the evaluation work by JUFO. As in Denmark and Norway, the evaluation of publication channels is a voluntary expert task. The research organisations – mostly universities and public research institutes – allow their faculty to use worktime on JUFO evaluations, and cover the costs of travel and accommodation related to face to face meetings. All experts involved in the panels have various other research, teaching, and administration tasks, duties, and engagements that take priority over voluntary expert tasks such as JUFO evaluations. The time and effort used for JUFO panel work may differ considerably between individual panellists, and some experts may need to periodically abstain entirely from the panel work.

An online survey of panel members in 2017 indicated that the workload for evaluating channels was indeed somewhat unequally distributed between panellists. While the experts are highly motivated during the first year of their term, when JUFO levels 2 and 3 are reviewed, their activity tends to somewhat decrease during the later years, when evaluation mainly concerns approving new additions to JUFO level 1. Throughout the four-year term, the panel chairs and vice chairs are responsible for confirming the panels' decisions regarding JUFO levels 1/0 based on the proposals of the panel members. In practice, it falls to the chairs to evaluate all the channels no other panel members have evaluated, as well as to decide between conflicting proposals regarding the approval of new channels for JUFO level 1.

In 2017, when panels were nominated for the current 2018–2021 term, the Steering Group sought to increase the panellists' level of commitment to the evaluation work, as well as the diversity of candidates and the coverage of different fields and disciplines. This was sought by (1) changing the recruitment procedure and increasing the number of panellists, and (2) introducing an annual panel meeting.

Concerning (1), recruitment of JUFO panellists, before 2017, the research organisations and learned societies provided lists of their candidates, including their background information. From 2017, all researchers who wished to become members of the panels had to submit a proposal for their own candidature via an electronic form and explain why they would be good panel members. The change required panellists to consider their willingness to participate in the evaluation of publication channels, and made the procedure less burdensome for organisations and societies, which simply indicated via an online form the candidates they supported for the nomination. The number of experts in the JUFO panels was also increased from around 225 to nearly 250.

Concerning (2), introducing an annual panel meeting, from 2019, panels have also met once a year between reviews of JUFO levels 2 and 3. In 2020, the meetings were organised entirely online due to the Covid-19 situation. The purpose of these meetings is to facilitate discussion of JUFO level 1 criteria, individual corrections required to JUFO levels 2 and 3 based on feedback from the research community, and other issues related to channel evaluation (e.g. open science).

The aforementioned changes (1 and 2) in recruitment and meeting procedures seem to have increased the panellists' level of activity. In the JUFO portal data, it is possible to see that the number and share of panellists registering evaluations in the JUFO portal have increased since 2017, while the number of evaluations per panellist is decreasing – meaning that the evaluation work is more equally and effectively distributed between panellists as a whole (Figure 3.3). Nevertheless, as expected, the differences between panellists remain (Figure 3.4), and the chairs still register a much larger number of evaluations than the other panellists on average (Figure 3.5).

There are also considerable differences between panels in the number of publication channels in JUFO levels 1, 2, and 3, which are taken into consideration in the evaluation of JUFO levels 2 and 3. Publication channels are listed for panels to evaluate by the JUFO secretariat at the time of registering publication channels. However, panels can request changes to the listings. The evaluation of book publishers and certain multidisciplinary journals (e.g. Nature, Science, PNAS) is made collectively by all panels in "panel 24 for multidisciplinary publication channels". Between 2010 and 2013, journals/series could belong to more than one panel's list, but in 2014, the JUFO Steering Group sought to decrease the amount of overlapping work by Expert Panels. Consequently, journals/series were divided between the panels in a mutually exclusive way. The same approach is used in Denmark and Norway: that is, each journal/series is evaluated by one panel only. This significantly decreased the number of channels in each panel's list (Pölönen & Ruth, 2015). Nevertheless, the number of channels evaluated per panellist differs considerably between panels (Figure 3.6).

3.3.2. Workload of JUFO panels

Overall, the amount of work is assumed to be larger on average for individual experts in Finland than it is in Denmark or Norway. This is because (i) Finland has the smallest number of experts involved in the channel evaluation procedure, (ii) the number of channels to be evaluated is relatively large and increasing, (iii) the experts are involved in the evaluation of channels for all levels, and (iv) the interval between reviews of levels 2 and 3 is longer in Finland than in the other Nordic countries.

There are considerable differences between the Nordic countries (i) in the number of panels and panellists. Norway has 331 experts in 89 panels, Denmark has 429 experts in 67 panels, and Finland has 246 experts in 23 panels (Table 2.1). In Finland and Denmark, panels have been established for the sole purpose of publication channel evaluation. In Norway, channel evaluation is an additional task given to existing expert groups established for professional and administrative development. At any rate, in JUFO panels in Finland, there is a smaller number of panellists overall, evaluating an equal or higher number of publication channels.

As observed in the previous chapter, in Finland, (ii) panellists' workload is also increased by the process of identifying new publication channels to be added to JUFO level 1 from the VIRTA publication data. This is a very heterogeneous group of channels, for which it is relatively time and effort consuming to establish whether or not they fulfil the criteria for JUFO level 1 (these criteria are discussed in Chapter 4). There is often little data to support evaluation, and no justification for inclusion/exclusion provided by researchers (unlike in the case of new channels explicitly proposed to be included by the research community). Additional challenges are posed by the fact that the journals and book publishers emerging from VIRTA data are often less well-established or local channels, the fact that available information may only be in languages other than English, Finnish, or Swedish, and the fact that it is increasingly difficult to distinguish between peer-reviewed and predatory journals in general. While most newly evaluated channels are added to JUFO level 0, the number of JUFO level 1–3 channels has also increased by 22% since 2012 and now amounts to almost 24,000 (Figure 3.1). To facilitate the evaluation for levels 2 and 3, since 2010, the JUFO panels have been informed by WoS- and Scopus-based journal metrics, as well as the levels or ratings in the systems of Denmark and Norway. In 2011 and 2014, the JUFO secretariat also calculated a composite metric for each journal/series to support the panels' work to nominate channels for JUFO levels 2 and 3. Indeed, as Saarela et al. (2016; 2020) suggest, automatic principles based on impact factors and other Nordic ratings could be further developed to assist the experts' qualitative judgement and possibly to save person-hours.

Furthermore, concerning (iii), evaluations for different levels, in Finland and Denmark, all evaluations of publication channels are carried out by the Expert Panels, including the distinction between levels 0 and 1, and the nomination of channels to levels 2–3. However, in Norway, new channels to be added to level 1 are evaluated in the first place by the secretariat's administrative decision (i.e. experts are consulted only in the most unclear cases). Thus, in the Norwegian system, the evaluation work of the Expert Panels is mainly restricted to nominations to level 2 (there is no level 3 in Norway). This is also a viable option for JUFO. As of 2015, the JUFO secretariat has been allowed to allocate clearly non-academic or local publication channels directly to level 0 (Pölönen & Ruth, 2015). However, this has not substantially reduced the number of channels evaluated by the panels. Introducing the Norwegian practice in Finland would entail a substantially decreased workload for the panellists, while naturally increasing the workload for the JUFO secretariat. Another option could be that, in addition to preparing the basic bibliographic and bibliometric information about channels, the JUFO secretariat uses more time and effort to verify some of the JUFO level 1 criteria (such as the existence of an expert editorial board and peer review status) on behalf of the panels, thereby decreasing the experts' workload. This could include increasing the resources of the JUFO secretariat with a full-time information specialist whose task is the maintenance of the bibliographic and bibliometric information base supporting the expert evaluation of publication channels and discovery of open access information.

Concerning (iv), evaluation intervals, in Norway, the panellists consider changes to level 2 incrementally every year. In Denmark, changes to level 2 are considered every two years, and to level 3 every four years. In Finland, levels 2 and 3 are reviewed every four years; however, individual corrections are possible during the intermediate years. The four-year interval is used to increase the predictability of the JUFO levels 2 and 3. It is unclear if it is more demanding from the perspective of workload to review levels 2 and 3 incrementally on an annual basis, as in Norway, or to organise a larger review every four years, as in Finland currently. The different procedures appear to have resulted in more or less similar numbers of changes between levels 1 and 2 from 2015 to 2019. In Norway, in 2019, a total of 2,094 journals/series were at level 2, of which 255 (12%) had not been at level 2 in 2015. In Finland, in 2019, a total of 3,057 journals/series were at levels 2 and 3, of which 345 (14%) were not at level 2 or 3 in 2015.

Summary:

- Researchers of different fields of science are motivated to contribute to JUFO expert panels' work of evaluating publication channels, regarding the task as for a valuable personal experience and as a service for the research community.
- The number of panellists is generally deemed adequate. However, the evaluation tasks remain somewhat unevenly distributed between panellists and chairs.
- The average evaluation workload per panellist is likely to be larger in Finland than in Denmark and Norway.
- It is unclear whether it is more demanding from the perspective of workload to review publication channels at JUFO levels 2 and 3 incrementally on an annual basis, as in Norway, or to organise a larger review every four years, as in Finland currently.
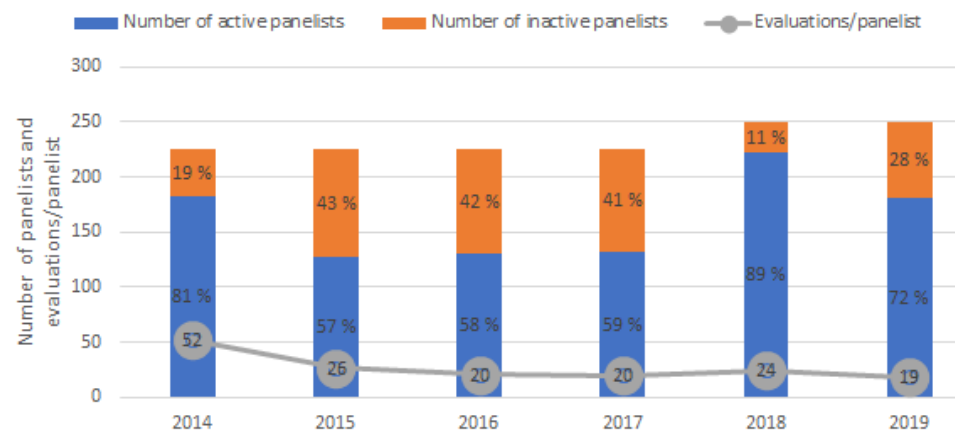
Figure 3.3. In most recent years, the evaluation workload has been more equally divided across JUFO panellists and has somewhat decreased overall. Total number of evaluations registered in the JUFO portal in 2014–2019: 33,871. Source: Publication Forum.
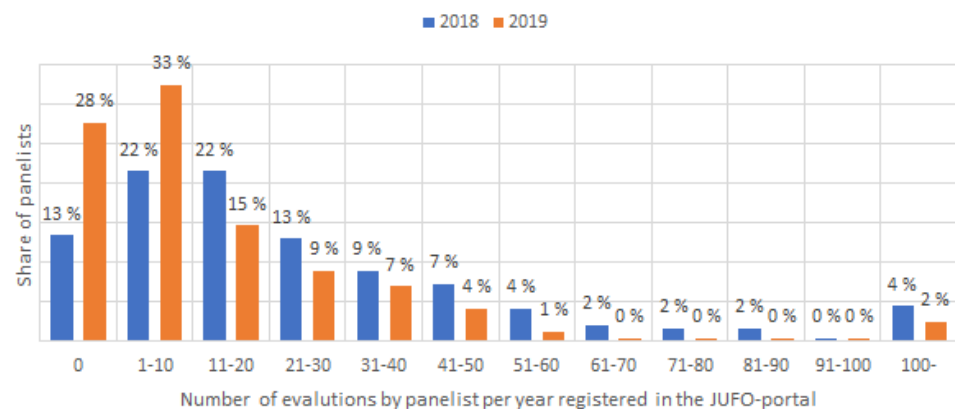

Figure 3.5. Panel chairs continue to assume a significantly greater evaluation workload than ordinary panel members. (Note: In 2018, JUFO levels 2 and 3 were reviewed (review of ratings). In 2019, only decisions between levels 0 and 1 were made (complementary evaluations).) Source: Publication Forum.

Figure 3.4. Despite the more equal distribution of evaluation workload in 2018-2019, substantial workload differences remain across individual panellists. (Notes. In 2018, JUFO levels 2 and 3 were reviewed (review of ratings). In 2019, only decisions between levels 0 and 1 were made (complementary evaluations)). Source: Publication Forum.
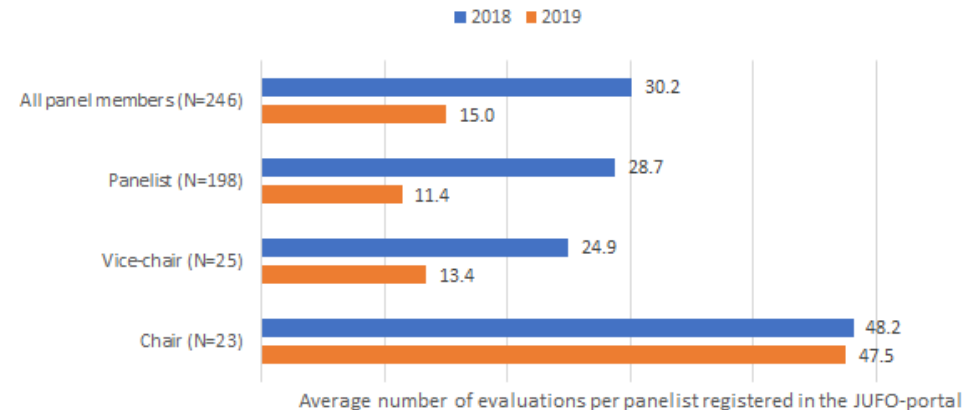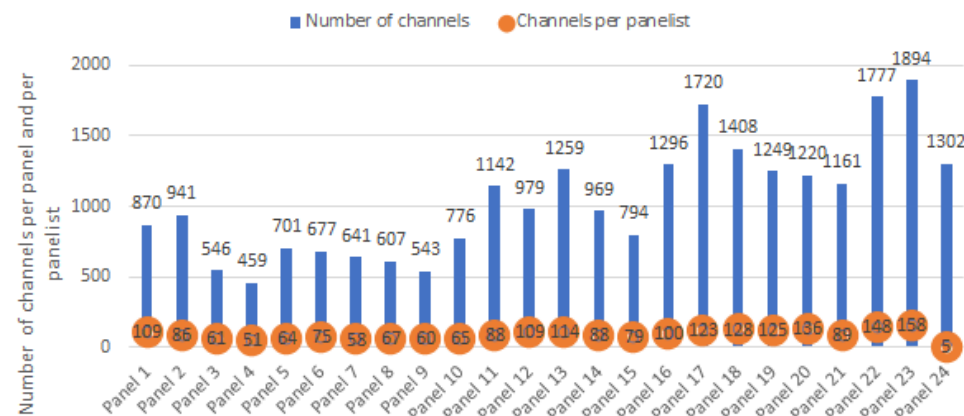

Figure 3.6. JUFO panels differ substantially in the numbers of journals/series to be evaluated at levels 1, 2, and 3. (Note: The number of journals/series by panel is given for 2019. Total number of panellists: 246. Total number of journals/series: 24,827). Source: Publication Forum.

3.4. Publication channel register and JUFO portal

The management of the bibliographic information of more than 33,000 publication channels by the JUFO secretariat, the evaluation of these publication channels by the 250 JUFO panellists, and the communication of JUFO levels and other relevant information to the research organisations and community require appropriate information technology (IT) services. The IT services provided for JUFO by the Federation of Finnish Learned Societies are mainly limited to the website (www.julkaisufoorumi.fi), which has been the main platform for communication of news and information about JUFO's activities since 2010. Since 2012, the website has also included a search engine or function for searching and browsing publication channels, as well as a function for suggesting new additions, upgrades, and downgrades to the list of publication channels. In 2020, the JUFO website was renewed, and the search engine at the Federation of Finnish Learned Societies website was abandoned. Instead, the research community is encouraged to use the JUFO portal operated by CSC.

As early as 2014, JUFO was relying increasingly on CSC – IT Center for Science (which is a joint venture company partly owned by the state of Finland [70%] and Finnish higher education institutions [30%]) to provide the most important IT services supporting the secretariat, the panels, and the general public. According to the JUFO Steering Group's maintenance plan, CSC is currently responsible for the IT implementation and maintenance of a database with publication channels (JUFO register) and an Internet user interface for the secretariat, expert panellists, and the general public (JUFO portal). The Federation of Finnish Learned Societies and CSC are jointly responsible for the design of the database and user interfaces, as well as for maintaining the updating of the bibliographic and bibliometric data of the database. With regard to the publication channel information, CSC is responsible for the large-scale updates of bibliographic and bibliometric data from external information sources, and the Federation of Finnish Learned Societies/JUFO is responsible for individual data updates and corrections. The Federation of Finnish Learned Societies and CSC each negotiate the financing required for the tasks related to the maintenance and development of the IT services directly with the Ministry and Education and Culture.

If necessary, joint negotiations take place between the Federation of Finnish Learned Societies, CSC, and the Ministry.

The JUFO register contains information on all the publication channels (journals/series and book publishers) that have been and are to be evaluated by the Expert Panels. High-quality data about publication channels are essential in supporting the experts' evaluation task and in keeping their workload reasonable. The data also facilitate the integration of JUFO levels in national and institutional information systems, and provide complementary information about added value (e.g. open access information) to researchers, as well as librarians and information specialists. The JUFO register supports the JUFO portal, as well as several other information services such as the national VIRTA Publication Information Service, the JUULI portal for browsing the VIRTA Publication Information Service (replaced in 2020 by the Research.fi portal), and the Finnish research organisations' local current research information systems (CRISs). The JUFO register is also integrated with the Nordic list – a joint Nordic register of publication channels. Publication channel information is openly available via the JUFO portal (including Excel download) and in a machine-readable format using an interface provided by CSC. For each channel, the register contains the level categories defined by the panels, as well as all bibliographic, bibliometric, and field information (Table 3.2).

Table 3.2. JUFO portal includes a wide variety of bibliographic and bibliometric data as well as field classifications for publication channels.

	Purpose	Content
Bibliographic data	Basic information to identify channels and to match JUFO levels to outputs in VIRTA	JUFO_ID, Name, Abbreviation, Other_title, Title_details, ISSNL, ISSN-print, ISSN-on-line, Continues, Continued_by, Channel type, Website, Country, Publisher, Language, Year_Start, Year_End, Active, Active_binary
Bibliometric data	Information supporting expert evaluation of channels and to help the public compare channels	Web of Science indexing, Scopus indexing, ERIHPLUS indexing, DOAJ indexing, Sherpa/Romeo indexing, level in Norway, level in Denmark, IF, IF5, Eigenfactor, Article Influence Score, CiteScore, SJR, SNIP, Publication volume, Predatory (Cabell's/DOAJ removed)
Field classifications	Helps to assign channels to panels, helps balance JUFO levels 2 and 3 across fields, and enables channel search by field	JUFO panel, Web of Science field categories, Scopus field categories, Norway panel fields, Denmark panel fields, Ministry of Education and Culture fields

The JUFO portal is a service that facilitates the work of the JUFO secretariat and the expert panellists. The portal also provides a public interface for the researchers and other members of the research community to interact with the JUFO system and panels. The main users of JUFO portal thus include the secretariat, the panels, and researchers and research community members (mainly academic faculty members), as well as the general public (Table 3.3).

Table 3.3. JUFO portal offers several functionalities to various user groups.

	Functionalities
JUFO secretariat	• Identifies publication channels based on proposals from the research community • Identifies publication channels based on peer-reviewed articles, monographs and edited volumes published by the research community, from the national VIRTA Publication Information Service • Registers and assigns publication channels and evaluation deadlines to panels • Manually checks and updates publication channel information
JUFO panellists	• Evaluate publication channels on lists provided (by the secretariat) to the panel
Research community members and the general public	• Search publication channels by name, ISSN/ISBN number, channel type, JUFO level, open access status, country, language, panel, and field • Compare publication channels based on bibliometric information • Suggest upgrades/downgrades of publication channels • Suggest additions of new publication channels • Suggest corrections to publication channel information • Indicate personal top 10 list of the most important channels

In addition to the JUFO portal, the JUFO register supplies information about JUFO levels of peer-reviewed outputs for the national VIRTA Publication Information Service. When research organisations report new peer-reviewed publications to VIRTA, VIRTA identifies the publication channel automatically based on a comparison of the publication's bibliographic information (ISSN, ISBN, channel name) about channels in the JUFO register. If the channel can be identified, the channel's JUFO ID and JUFO level are registered to the publication's metadata. If VIRTA is unable to identify the channel automatically, information about the publication is sent to the JUFO portal, and the channel is identified manually by the JUFO secretariat. All new channels are added to the JUFO register and assigned to the panels for evaluation.

From the VIRTA Publication Information Service, publication data with JUFO levels are supplied to:

- the Ministry of Education and Culture for the annual calculation of core funding for universities
- the VIPUNEN portal for statistics on research output of the Finnish higher education institutions
- the Research.fi portal for browsing all the publication data reported annually to the Ministry of Education and Culture
- research performing and funding organisations

Currently, the Ministry directs 75,000 euros (equivalent to roughly 6 person-months) annually to CSC for the technical development and maintenance of the JUFO register and JUFO portal (this is a very small share of CSC's total budget). The resources that the Ministry of Education and Culture allocates annually to CSC for purposes related to JUFO are principally used for the maintenance of the basic functions of the JUFO portal. The resourcing seems adequate for this basic maintenance, because one of the most important functions of the JUFO portal is to support the work of the expert panellists, and 72% of the panellists are fairly or highly satisfied with the JUFO portal (see Appendix 2 for the results of the online survey of panellists in 2019). However, CSC's resourcing seems insufficient for the development of the advanced functionalities of the JUFO portal for the benefit of the JUFO panellists and the scientific community, which has constantly been delayed. The functionalities related to the JUFO portal that need further development and improvements include at least the following:

1. Timeliness and accuracy of data about publication channels. New channels are added to the register and assigned to panels for evaluation on a daily basis. The Expert Panels have not always been able to rely on complete and accurate bibliometric information about publication channels, which may put the quality of evaluation at risk and increases the panellists' workload. The information about field classifications supporting a publication channel search has also commonly been outdated,.

2. Statistics supporting JUFO level 2 and 3 evaluation. The JUFO panels need field-specific statistics to monitor level 2 and 3 quotas across different sub-fields and specialties. They also need tools to compare channels in specific fields based on all the available bibliometric information. The JUFO portal does not currently facilitate the review of JUFO levels 2 and 3 in these respects.

3. Transparency of panel work. The JUFO levels and all the information supporting expert evaluation is openly visible in the JUFO portal. Nevertheless, the grounds for JUFO panels' decisions or the proposals for new additions, upgrades, and downgrades from the research community are not transparently provided in the current JUFO portal.

4. Open access information. The JUFO portal currently provides information on the open access (OA) status (DOAJ and Bielefeld lists) and self-archiving policies (Sherpa Romeo) of the journals included in the JUFO register. The JUFO portal could be developed further to provide more extensive OA information, including easy discovery of journals in which the Finnish researchers can publish OA free of charge or with a discount under the FinELib consortium's publisher agreements, as well as journals in which they can publish in compliance with the OA requirements of national and international research funders (e.g. Plan S).

Summary:

- The resources the Ministry of Education and Culture allocates annually to CSC are mainly for maintaining basic functions of the JUFO portal, which delays the development of new functionalities for the benefit of the JUFO panellists and the scientific community.
- Strong effort is needed to ensure the timeliness and accuracy of the bibliographic and bibliometric data about publication channels, because the quality and availability of data in JUFO portal contributes to the quality of evaluations and decreases the panellists' workload.
- The JUFO portal could be further developed by increasing the transparency

of the evaluation work in the portal, by adding tools for statistics and visualisations (e.g. to enable field-specific comparisons of journals), and by providing more comprehensive information on OA publishing options.

3.5. Research community

The Finnish research community is involved in the operation of JUFO, both through the participation of representatives of research and other organisations in JUFO's Expert Panels and Steering Group, and through the private engagement of individual researchers (as explained in Chapters 3.1. and 3.3).

- JUFO Steering Group: The Federation of Finnish Learned Societies, the Ministry of Education and Culture, the Finnish Council of University Rectors (Universities Finland), the Academy of Finland, the Finnish University Libraries' Network (FUN), the National Library of Finland, and the IT Centre for Science (CSC) nominate their representatives by email. In addition, the learned societies may suggest experts to represent the various main fields through an electronic form.
- JUFO panels: Universities, public research institutes, learned societies, and science academies may register a list of institutional email addresses of their candidates for field-specific Expert Panels through an electronic form. In addition, all researchers who wish to become members of the JUFO panels submit applications with the requisite background information through an electronic form.

All the organisations with which the members of the JUFO Steering Group and panels are affiliated permit their employees to use part of their worktime for activities related to JUFO evaluations, and take responsibility for any travel and accommodation costs for the meetings. In addition, universities and other research organisations have invested in the development of JUFO-related expertise among the personnel who support the collection of publication data (e.g. library staff), as well as personnel who support research management and assessment (e.g. research and quality management service staff).

Researchers are engaged with JUFO in several ways, in addition to participating in the evaluation of publication channels as members of the JUFO panels. Most notably, they have the opportunity to give the panels feedback on the evaluations by proposing changes to the JUFO levels on the Publications Forum website and the JUFO portal. They can also propose new publication channels for addition to the classification and determine the ten most important journals/series and the book publisher for their own research on the JUFO portal. Between 2014 and 2019, a total of 11,147 suggestions for new additions, upgrades, and downgrades were registered through an electronic form on the Federation of Finnish Learned Societies website and JUFO portal (Figure 3.7).
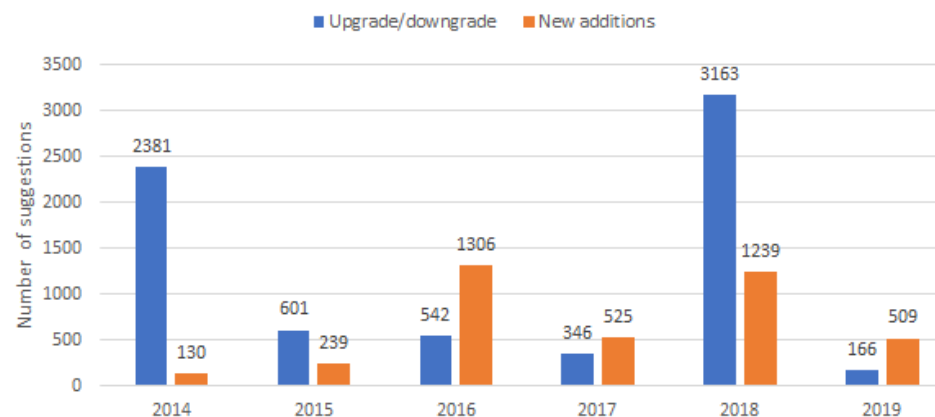

Figure 3.7. Research community members annually submit hundreds or thousands of suggestions for additions, upgrades, and downgrades of publication channels through JUFO websites. In 2014 and 2018, the research community has been specifically invited to give feedback to support the review of channels nominated for JUFO levels 2 and 3. Source: Publication Forum.

Summary:

- Research communities, including research organisations, societies, and individual researchers, are engaged with the JUFO system mainly through their participation in the JUFO Steering Group and JUFO panels, and through proposals concerning JUFO levels.

3.6. Cost-effectiveness

In this section, we estimate the cost-effectiveness of the JUFO system and organisation. As the European Commission's Mutual Learning Exercise report on Performance-Based Funding of Universities (European Commission, 2018) has recently pointed out, running a performance-based research funding system (PRFS) is expensive. In Finland, given the financial implications of the PRFS, the cost-effectiveness of the JUFO classification system is also a relevant concern. In the case of JUFO, the issue of cost-effectiveness can be approached from several different perspectives:

- Is JUFO organised cost-effectively compared with the organisation of expert evaluation of publication channels in other countries, especially Norway and Denmark?
- Is an evaluation system based on Expert Panels like JUFO a cost-effective way of assessing the quality of publication channels compared with alternative systems such as citation-based metrics, for example?
- Is the JUFO system a cost-effective way of assessing the quality of the Finnish universities' publication output for the use of a PRFS compared with alternative methods such as citation analysis or peer review?

One possible indicator of the effectiveness of a research assessment system – often used by research funding agencies especially – is the proportion of all administrative costs of the funding agency in the total budget of the agency (including funds granted for research, as well as the administrative costs). For example, in the case of the Academy of Finland, the administrative costs needed for the operations (including peer review) amount to 3% of the total budget in 2011 (Arnold et al., 2013). Indeed, it is generally quite easy to establish the direct administrative costs of a research assessment system (Science Europe, 2020). In the case of JUFO, the Ministry of Education and Culture annually grants around 250,000 euros directly to fund the operation of JUFO:

- 170,000 euros to the Federation of Finnish Learned Societies (2 full-time persons) for the administration, coordination, and support of the Expert Panels' work.
- 75,000 euros to CSC – IT Center for Science for the technical development and maintenance of the publication channel register and JUFO portal.

The Ministry annually distributes more than 200 Million Euros (13%) of core funding for universities based on publications and JUFO levels, so the ratio of JUFO's direct administrative costs to the total funding allocated by the Ministry based on JUFO is around 0.13%. Superficially, this figure indicates that the evaluation system based on JUFO is more than 20 times more cost-effective than the system of the Academy of Finland.

However, what makes the assessment of cost-effectiveness particularly challenging in the case of JUFO is that most of the costs it accrues are not direct monetary costs, but indirect non-monetary costs like worktime and effort. That is, JUFO's operation requires extensive worktime and effort from a wide range of individuals and organisations beyond the salaried individuals of the JUFO secretariat, including the expert panellists and the Steering Group, as well as collaborators at universities, public research institutes, and learned societies. The most time- and effort-consuming part of the work is related to the management and evaluation of publication channels.

With respect to the indirect costs, the evaluation of publication channels takes place in Denmark, Finland, and Norway in an approximately similar manner, scale, and

scope. A closer comparison of the evaluation procedures (see Chapters 3.1 and 3.3) shows that while JUFO in Finland has the smallest number of experts, expert evaluation is more time- and effort-consuming in Finland than in Denmark and Norway. This is because all publication channels used by the Finnish researchers are annually identified for evaluation from the universities' publication data (reported in the VIRTA Publication Information Service). Because of the smaller number of experts and the greater number of publication channels to be reviewed annually, the average amount of work per individual expert is likely to be higher in Finland than it is in Denmark or Norway. Partly for this reason, JUFO's Steering Group has attempted to introduce several improvements to the organisation of the evaluation work over the years to decrease the experts' workload.

At any rate, it remains difficult to estimate the indirect cost of the unpaid voluntary expert effort and working time of around 250 members of the 23 Expert Panels. Nevertheless, we have approached this question by estimating (1) the time that JUFO panellists reportedly use for the evaluation work annually, and (2) the number of meetings the JUFO panellists join, and number of evaluations they conduct annually:

1. Time used for evaluation. According to the responses of 56 panellists in an online survey in 2017, the average time spent on expert evaluation was four hours per month, which makes around 48 hours a year per panellist and a total of 12,000 hours for 250 panellists. According to the Finnish Union of University Professors, a professor's median monthly salary in 2019 was €7,128, pointing to an hourly salary of €45 (assuming 160 working hours per month). If we assume the indirect labour costs for the employer organisations to be an additional 40% (on the salary costs), the labour cost per hour is €62. We can therefore estimate that the indirect working time cost of the 250 panellists (12,000 hours) is around €740,000 annually. Note that this does not include travel and accommodation costs for face to face meetings, but such costs are negligible relative to the labour costs.
2. Number of meetings and individual evaluations. It is known that panellists register an average of 20 evaluations of publication channels annually (Figure 3.3), so 250 panellists register a total of 5,000 evaluations in the JUFO

portal annually. Panellists also participate during their four-year term in six face to face, three-hour meetings in Helsinki, which makes 1.5 days per year per panellist, and a total of 375 days for 250 panellists. The Academy of Finland pays an expert €360 for a full-day of panel work and €50 per individual evaluation. With these benchmark costs, we arrive at a cost of €1,540 per year per panellist, and a total of €385,000 for 250 panellists annually. Note that JUFO panel meetings are only half-day, and the evaluation of an individual publication channel is not as time consuming as the evaluation of a funding proposal.

If the indirect labour costs are hence estimated to be in the range of 385,000–740,000 euros for the experts' time and effort, combined with €250,000 of direct costs, the total indirect labour, and direct administrative and operational costs amounts to 635,000–990,000 euros. Yet even at this level, the total costs' ratio to the aforementioned amount of funding allocated on the basis of JUFO (€200,000,000) remains at the moderate level of 0-3–0.5%. Again, comparing this to the Academy of Finland's ratio of 3 %, for example, it can be concluded that JUFO remains a relatively cost-effective way of allocating government funding for universities. Of course, it must be emphasised that the evaluations carried out by JUFO (publication channels) and the Academy of Finland (projects) differ substantially.

Although the JUFO system is relatively cost-effective, it is possible to further improve cost-effectiveness by decreasing the amount of expert work required by the system's operation. There are three possible ways to decrease the expert panellists' workload:

1. Improving the information base supporting expert evaluation by ensuring that the bibliographic and bibliometric data in the JUFO register is accurate, up-to-date, and comprehensive. This decreases the time and effort needed from the experts to search for information on the Internet. However, this option requires additional work from the JUFO secretariat.
2. Increasing the role of the secretariat in complementary evaluations, in which panels decide the assignment of channels between JUFO levels 0 and 1. The secretariat could verify some of the JUFO level 1 criteria (e.g. editorial

board and peer review status) on behalf of the experts. As in Norway, the approval of channels for level 1 could also be an administrative decision taken by the secretariat. However, this also requires additional work from the secretariat, as well as high-quality information.

3. Supporting the expert evaluation of publication channels for JUFO levels 2 and 3 with automated rankings based on the available information on the impact and quality of channels (Saarela et al., 2016; 2020). This requires high-quality information and the development of the JUFO portal.

To reduce the experts' workload, additional work is therefore needed from the JUFO secretariat. To this end, an increase in the resources of the JUFO secretariat from two to three full-time persons should be considered. This would mean an increase in the direct administrative costs of the JUFO operations and secretariat, but the amount would remain small compared to the indirect costs saved. If the addition of one person to the JUFO secretariat decreased the workload of JUFO experts by 20%, the indirect costs saved would be about €113,000 (0.2 x the midpoint of the indirect cost range of 385,000–740,000 euros). This is significantly higher than the added direct costs of the secretariat due to the addition of one employee, i.e. €85,000 (assuming a 50% increase in the direct costs, €170,000, due to the increase of headcount from two to three).

We consider it beyond the scope of this self-evaluation to compare the cost-effectiveness of JUFO with other methods that could possibly be used to assess research outputs to allocate core funding for universities. However, it can be assumed that a funding system based on full-fledged qualitative peer reviews would be more expensive than an indicator-based system (European Commission, 2018; Science Europe, 2020) like JUFO. An even less costly alternative than a system like JUFO would be to fully rely on citation-based journal metrics such as the Journal Impact Factor. However, as explained above (Chapter 2, Figure 2.1), such a system would fall substantially short of the scope and purpose of the JUFO system in terms of comprehensiveness, responsibility, and the equal treatment of the various scientific fields (Pölönen et al., 2020a). It is therefore not meaningful to compare the costs of such a system, with

substantial shortages, with those of a substantially more comprehensive system like JUFO.

Finally, while it is clear that the costliest part of the JUFO system is the expert work needed for the evaluation of publication channels, it must still be noted that most experts involved themselves do not view their involvement as a cost factor. Rather, many of the experts find their involvement in the panels a personally rewarding experience (see Appendix 2, Figure 39), as well as a way to contribute and "give back" to the scientific community. Indeed, according to the Universities Finland working group, a system like JUFO is also required for the experts of the scientific community to have a say, allowing them to "determine what constitutes good research and what criteria are in place to assess it".

Summary:

- Considering the amount of funding allocated annually to Finnish universities by the Ministry of Education and Culture based on JUFO levels, JUFO system provides a cost-effective quality measure for the publication performance indicator of the funding system.
- The costliest part of the JUFO system is the expert work required for the evaluation of publication channels.
- The workload of expert panellists could be reduced by improving the information base supporting channel evaluation, making decisions regarding JUFO levels 0 and 1 administratively (by JUFO secretariat rather than by the expert panels), and assisting expert judgement with automated rankings of publication channels based on the available information on their impact and quality.

4. JUFO levels as quality indicator

Summary

Question 3. Do JUFO classification levels provide a valid and balanced quality indicator across fields?

Key take-aways:

- JUFO panels are provided information about an extensive range of citation-based journal metrics and quality indicators regarding the publication channels to be evaluated. Yet the panels can decide themselves how much weighting to give to different indicators in level 2 and 3 assignments of the JUFO system.
- While most of the alternative journal metrics and indicators are available to the research community via the JUFO portal, specific grounds for decisions to assign channels to JUFO levels 2 and 3 are not provided.
- The vast majority of journals/series at all JUFO levels offer various routes to open access, such that the JUFO classification is not inconsistent with national level open access goals in Finland.
- The JUFO classification also provides a relatively balanced representation of national language publication channels at JUFO level 2, which is especially important in the fields of Social Sciences and Humanities.
- There is no strong consensus among the research community about whether JUFO levels 2 and 3 should remain separate or not. In any case, most experts in JUFO panels consider that the quotas for JUFO levels 2 and 3 should be increased to improve the balance of JUFO levels across subfields.
- The distinction between JUFO levels 1 and 0 is important, and the basic criteria (e.g. expert editorial board and peer-review) required from publication channels on level 1 are clear. However, there are also more subjective criteria for excluding journals from level 1 (e.g. the local, questionable, and/or marginal nature of the channel), which are based on subjective judgment of the panels. Consequently, JUFO level 0 includes rather diverse types of publication channels, and the channel-specific reasons for their exclusion from JUFO level 1 are not communicated in detail in JUFO portal.
- Publication channels on JUFO levels 2 and 3 broadly correspond to citation-based journal metrics as well as the classifications/ratings of other Nordic countries, even if there are also exceptions. There are no indications of severe national bias that would compromise the validity of JUFO classifications as a measure for the average quality of the Finnish universities' publication output.
- JUFO levels are also consistent with qualitative evaluations of research projects by international experts of the large research funder the Academy of Finland; the share of research published in publication channels at the highest JUFO levels (2 and 3) is much larger for publications stemming from research projects funded by the Academy of Finland (and evaluated as high-quality projects by international expert panels) than for all publications produced by Finnish universities overall.
- JUFO levels are also highly consistent with citation-based analysis; the average citation impact of publication output published in channels classified at higher JUFO levels are significantly higher than the average impact of publication output published in the channels of the lower JUFO levels.
- JUFO levels are a relatively neutral indicator of the average research quality of the universities' publication output across scientific fields, including multidisciplinary publications, although certain differences remain between different publication types and languages, as well as different open access types. Overall, however, there are no severe biases that place particular scientific fields or universities at a significant advantage or disadvantage.
- The scientific community itself can promote the integrity of the JUFO evaluation by nominating members and providing feedback to the JUFO panels.

In this chapter, we describe the number and nature of publication channels and classes/levels in the JUFO classification system, and analyse how balanced the JUFO levels are across the main scientific fields, publication types, and languages, providing analyses of how the JUFO levels reflect differences in the scientific quality and/or impact of Finnish research.

4.1. Overview of JUFO levels

In JUFO, the peer-reviewed publication channels are divided into three categories: basic scientific/scholarly channels (Level 1), leading scientific/scholarly channels (Level 2), and top scientific/scholarly channels (Level 3). In addition, all publishing channels evaluated by panels that do not meet the minimum criteria for JUFO level 1 are listed in the JUFO level 0 category. Level 0 does not necessarily imply that the publication channel is of low quality (let alone zero quality), but only indicates that the channel did not meet all the criteria for Level 1 at the time of assessment.

In Finland, as in Denmark and Norway, the evaluation of publication channels is primarily based on expert evaluation. However, the experts' evaluation work is supported by a variety of quality and impact indicators concerning the publication channels. A major challenge for the panels is to produce a rating that is more balanced between scientific fields and disciplines than a rating that is exclusively based on a single quality or impact indicator such as the Journal Impact Factor (JIF). This challenge also involves the need to operate with a framework of "level quotas" (i.e. the principle of being able to assign only a limited number of publication channels at the higher JUFO levels), which was originally introduced in the Norwegian model with the aim of increasing the consistency of ratings across different panels (and hence different scientific fields and disciplines).

In Finland, the "panel quotas" determine how many publication channels each panel can classify at the higher JUFO levels 2 and 3, especially for journals/series. The publication volume – the three-year average number of peer-reviewed articles published annually (by the journals, not by authors from Finland) – of the journals/series

(including conferences) classified as level 2 can be a maximum of 15%, and of the journals classified as level 3, it can be a maximum of 5% of the aggregate publication volume of the journals classified as levels 1–3. In the case of book publishers, different quotas are used: a maximum 10% of all JUFO level 1–3 book publishers can be nominated for level 2, of which a maximum of 10% can be nominated for level 3. A result of the framework of level quotas is that the number and share of JUFO level 2 and 3 journals/series differ considerably between panels (Figure 4.1).

4.1.1. Publication channel types

A scholarly publication channel has distinct editorial standards and procedures regarding the peer review and editorial evaluation that all the outputs – articles and books – published in the channel have undergone (Pölönen et al., 2020a). In JUFO, a "scientific publication channel" refers to printed and digital journals and publication series, as well as book publishers specialising in the publication of scientific research results. Such publication channels typically have an editorial review board consisting of experts, and having an article (or book) accepted for publication in the channel necessitates that the article passes a quality evaluation process recognised by the scientific community, most typically, a referee/peer evaluation process. Overall, scientific publication channels are evaluated in JUFO primarily in terms of their scientific quality and impact, not their societal impact. Yet scientific publication channels may also publish non-peer-reviewed publications such as comments, reviews, and handbooks.

In JUFO, publication channels are divided into three types:

1. Journals/series with ISSN. This publication channel type includes scientific journals, book series, and series of proceedings of a regularly organised conference. Journals, book series, and proceedings with an ISSN are identified using the title recorded at the International ISSN Centre. The main rule is that the book series of Finnish book publishers are classified separately in JUFO, while the book series of foreign book publishers are not classified. When the book series is not classified in JUFO, the assessment of book pub-

lications (chapters and monographs) is based on the book publisher.

2. Book publishers with ISBN. Book publishers are identified by the name in the ISBN registry or by another established name. In JUFO, such a book publisher refers to the publisher who is responsible for a publisher ISBN (i.e. not to other kinds of publisher or printing house). Publishers who use self-publishing ISBNs are not primarily treated as book publishers. If a book publisher uses several imprints, each imprint is classified as an independent publication channel (e.g. Taylor & Francis has several imprints, including Routledge and CRC Press). A publisher's subsidiaries in different countries are considered to belong to the same publication channel. If a faculty or institute of a university has their own ISBNs, they are nevertheless considered to represent the same publication channel as the university overall.

3. Conferences without ISSN or ISBN. In addition, JUFO classifies exceptionally a limited number of conferences without an ISSN or ISBN, as identified by the well-established name of the event. Panel 2 (Computer and Information Science) and Panel 9 (Electrical and Electronic Engineering, Information Engineering) can classify a conference as an independent publication channel in cases where the JUFO level of the main channel – i.e. the publication series (e.g. LNCS) or the book publisher (e.g. IEEE or ACM) – does not adequately reflect the quality level of the publications of the specific conference.

The journals/series and conferences are divided between the panels according to the discipline to ensure the responsibility for evaluating each publication channel is limited to one panel. An exception to this rule is a small number of multidisciplinary general science journals (e.g. Nature, Science, and PNAS). These multidisciplinary publication series, as well as most of the book publishers, have been placed in a virtual panel of general publication channels (Panel 24), which is common to all panels. That is, all panels can participate in the evaluation of the channels placed in Panel 24.
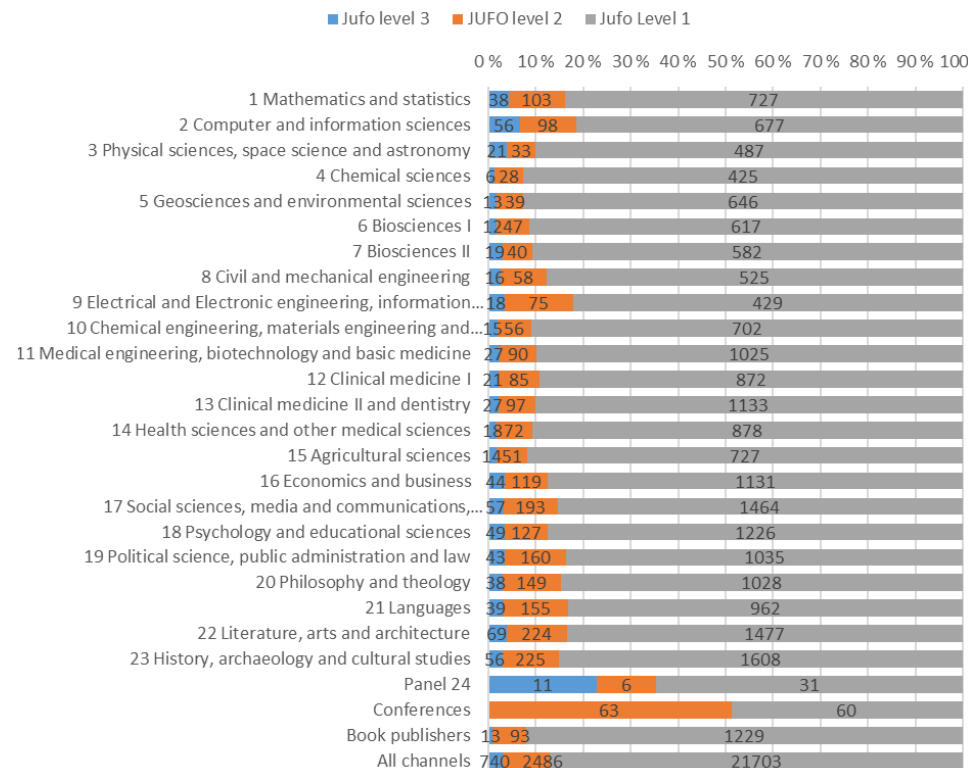

Figure 4.1. The numbers and shares of JUFO level 2 and 3 publication channels differ between panels (journals/series) and publication channel types. The differences are mainly due to the framework of level quotas, which limits the number of channels that the panels can nominate to the higher JUFO levels based on the volume of articles published globally in the channels (i.e., in fields, wherein individual publication channels include a larger number of articles/publications yearly, a lower number of channels 'fit' on levels 2 and 3). Panel 24 includes multidisciplinary journals, and conferences are only exceptionally listed as channels.

4.2. JUFO level criteria

In this section we provide a concise description of the evaluation criteria of publication channels for different JUFO levels.

4.2.1. JUFO level 1

Level 1 is the "basic" category of the JUFO classification, which contains the vast majority of established international and domestic peer-reviewed publication channels. Domestic and international journals/series, conferences, and book publishers meeting the following criteria can be accepted for level 1:

- The channel specialises in the publication of scientific research results. Channels that publish peer-reviewed publications on a regular basis can be accepted into level 1. Channels that occasionally publish individual scientific publications are not accepted into level 1. Scientific publishing channels acceptable to level 1 may also occasionally publish non-peer-reviewed articles or books, or those aimed at practitioners or the general public, besides the peer-reviewed articles and books aimed at the scientific community. However, to be acceptable for level 1, publication channels should indicate as clearly as possible which of their articles and books are peer reviewed, and which are not.
- There is an editorial board consisting of experts. To be acceptable for level 1, publication channels must have an editorial board including specialists in the field working in universities or research institutes.
- The scientific publications are subject to peer evaluation focusing on the entire manuscript. "Peer review" refers to a procedure whereby a journal, conference, or book publisher invites experts in the field to make an evaluation of manuscripts offered for publication, focusing on the scientific merits of the manuscript and its fitness for publication in the publication channel in question. Furthermore, in level 1 publication channels, the peer review must cover the entire manuscript to be published, not just the abstract (as is the case with e.g. certain conferences).

- As further exclusion criteria, a publication channel is not included in level 1 even if it meets the above criteria if:
- The publication channel is "local", in the sense that more than a half the authors of the publication channel represent the same research organisation, which also acts as the publisher (e.g. universities' and research institutes' own publication and dissertation series).
- The scientific level or relevance of the publication channel is questionable (e.g. questionable predatory journals or publication channels that publish scientific papers in exchange for a fee, without proper quality evaluation).

4.2.2. JUFO level 2

Level 2 is the "leading" category of the JUFO classification, and contains only a very limited group of peer-reviewed publication channels. Publication channels at level 2 are mainly high-quality international publication channels, but high-quality publication channels in the national languages (Finnish, Swedish) are also included, especially in Social Sciences and Humanities.

International journals/series, conferences, and book publishers can be accepted to level 2 if they meet the aforementioned criteria for level 1 (Chapter 4.1.2), as well as the following criteria:

- The publication channel has a wide reach and high respect among international experts in the field.
- Researchers from different countries seek to publish some of their best results in the channel.
- Editors, authors, and readers of the channel represent various nationalities.

Not all publication channels meeting these criteria can be accepted to level 2, but the panels must identify, while operating within their own "panel quota" for level 2, the publication channels attracting the highest quality publications as a consequence of extensive competition and demanding peer reviews.

In the nomination of channels for JUFO level 2 (and level 3), open access can also be considered. At the highest JUFO levels (2 and 3), JUFO panels can favour a directly open access channel or one allowing self-archiving of a peer-reviewed version of a manuscript if this channel is seen as an equal alternative in scientific quality to a channel representing the same discipline which does not allow equally open access. Only a small share of Gold OA journals is found at JUFO levels 2 and 3. However, the vast majority supports Green OA, meaning an immediate self-archiving of accepted or published versions of the manuscript in an open access repository. Gold OA journals play a more important role in JUFO levels 1 and 0 (Figure 4.2). It is known that compared to journal publishing, the open access options in the case of book publishers remain much more restricted (Pölönen et al., 2020b).

Depending on the discipline, the impact and prestige of the publication channels in the international scientific community can be estimated using the citation-based journal metrics (e.g. JIF, SNIP) and level rating indicators from Norway and Denmark that the JUFO secretariat provides for the use of panels. In addition, the panels receive upgrade and downgrade suggestions from the research community (e.g. via the JUFO portal), and they can use this feedback to support their assessment. Finland-based channels aimed at international audiences are evaluated in comparison with other international publication channels. Book publishers are accepted to level 2 (and 3) by all the panel chairs, acting in corpore, based on a preliminary proposal by the Social Sciences and Humanities (SSH) panel chairs (Panels 14 and 16–23).

In the scientific fields of Humanities and Social Sciences (Panels 14 and 16–23), JUFO Level 2 status can also be granted to leading Finnish- or Swedish-language publication channels which have a wide coverage of high-quality research on Finnish society, culture, or history. Due to the lack of citation data, the scientific impact of the domestic-language publication channels cannot be appropriately measured. Instead, to be accepted for level 2, the domestic-language publication channels need to meet the following criteria:

- The quality assessment of the scientific writings must be in line with the best practices.
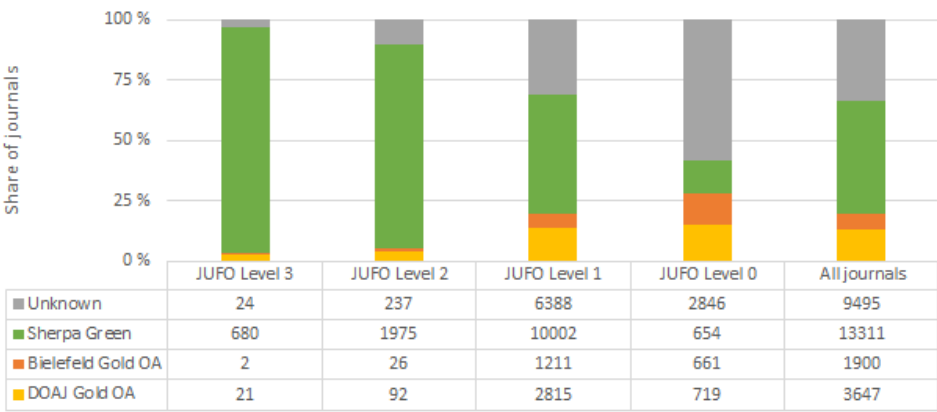

	JUFO Level 3	JUFO Level 2	JUFO Level 1	JUFO Level 0	All journals
▨ Unknown	24	237	6388	2846	9495
▮ Sherpa Green	680	1975	10002	654	13311
▮ Bielefeld Gold OA	2	26	1211	661	1900
▮ DOAJ Gold OA	21	92	2815	719	3647

Figure 4.2. The vast majority of JUFO classified journals/series enable some routes to open access. Green OA is more prevalent on levels 2 and 3 while Gold OA is more prevalent on JUFO levels 1 and 0. In addition, Green OA journals may offer Hybrid OA, i.e. the option to buy individual articles OA. Green is defined in this analysis as a publisher permission, registered in Sherpa Romeo, for immediate self-archiving of accepted or published versions of the manuscript. Total number of journals: 28,351. Source: DOAJ, Bielefld, Sherpa Romeo, and JUFO.

- The publication channel must be among those that cover the research in the respective discipline most comprehensively and are used by the entire domestic scientific community in that discipline.
- The context of the research problems is strongly focused on society in Finland, or its Finnish- or Swedish-speaking culture.
- Publishing in these channels is widely regarded as of equal merit to publishing in international level 2 channels.

Again, not all publication channels meeting these criteria are included in JUFO level 2; level 2 only includes a limited selection of the highest-quality and most comprehensive Finnish- and Swedish-language publication channels that cover disciplines in which the production and publication of new scientific information in these national languages is justified (due to their focus on society and culture in Finland). Process-wise, it is the chairs of all the SSH panels (Panels 14 and 16–23), acting in corpore, who make a consensus decision regarding the Finnish- and Swedish-language publication channels to be accepted to level 2.

The original 2012 rating included three book publishers and only four journals/series publishing in Finnish or Swedish at level 2. Following a position statement issued by 60 learned societies, the number of Finnish- and Swedish-language channels at level 2 in the SSH fields was increased considerably. Currently, the JUFO level 2 includes four book publishers and 23 journals and book series publishing a broad range of SSH research in the national languages. This offers a balanced representation of national language publishing, which is especially important in the SSH fields. SSH publications concentrate heavily on national language channels, whereas foreign language publications are distributed in a large number of outlets. The share of Finnish-language SSH output at level 2 corresponds roughly to the share of Finnish-language publications in general (Pölönen, Auranen, Engels, & Kulczycki, 2018).

4.2.3. JUFO level 3

Level 3 is the "top" category of the JUFO classification. Indeed, level 3 is a subcategory of level 2, so publication channels accepted to level 3 also need to meet the aforementioned criteria for level 2 (see 4.1.3). In addition, to be accepted to level 3, the channel must meet the following criteria:

- The research published in the publication channel typically represents the very highest quality level in the discipline and has a very high impact (e.g. as measured by citation indicators).
- The publication channel covers its discipline/field comprehensively, and is not limited to addressing narrow special themes alone.
- Both the authors and readers of the channel are international, and the editorial boards consist of the leading researchers in the field/discipline.
- Publication in the publication channel is most highly appreciated among the international research community of the field.

Not all publication channels meeting these criteria can be accepted to level 3, but the panels must identify, while operating within their own "panel quota" for level 3, the publication channels attracting the highest-quality publications as a consequence of extensive competition and demanding peer reviews. The panels will prepare a pro-

posal for publication channels to be included in level 3, and the chairs of all the panels, acting in corpore, make a decision to include journal/series and book publishers in the level 3 category.

4.2.4. JUFO level 0

JUFO level 0 has no specific quality criteria. To be included in level 0, journals/series, conferences, and book publishers must meet the formal requirements of a publication channel (e.g. have an ISSN or ISBN) and have been considered for admission to JUFO level 1. Those publication channels that did not meet the requirements for JUFO level 1 when the evaluation was made are placed in level 0. Originally, level 0 was called "other publication channels". However, this category was included in the Ministry of Education and Culture's funding model as JUFO level 0. The name was therefore changed to JUFO level 0. JUFO level 0 is sometimes misguidedly interpreted in the Finnish research community and especially the public discussion as a "label" for publication channels of low or zero quality. However, some of the level 0 channels may meet the basic criteria regarding the expert editorial board and peer review.

It has been a conscious decision in JUFO not to publicly indicate a list of predatory journals but to place journals and book publishers of questionable quality in JUFO level 0. To avoid and minimise confusion, it is necessary to indicate and communicate more clearly and transparently the various reasons a channel may be listed in JUFO level 0. These may include:

- Local channels. The peer-reviewed channels published by universities and research institutions have also been placed in level 0 if they mainly serve the needs of researchers in their own organisation.
- Quality and relevance. The JUFO Expert Panels can also place in JUFO level 0 peer-reviewed channels that are considered marginal for Finnish research or poor in quality at level 0 (for example, predatory journals).
- New channels: Channels that are just starting their operation can be placed at level 0 to begin with until the panels are better equipped to evaluate their publishing.

- Target audience: Some channels are primarily intended for professional and general audiences. However, drawing the line between these and the academic/scholarly channels is not always clear.
- Language. Especially in the case of channels publishing in languages other than English, Finnish, or Swedish, it may happen that the Expert Panel is unable to make an appropriate assessment.
- Insufficient information. Frequently, the reason channels are placed in JUFO level 0 is that the required information is not transparently presented and available on the channel website.

Publication channels that did not meet the requirements concerning JUFO level 1 when the evaluation was made and that were placed in level 0 can later be reconsidered for an upgrade to level 1 in the continuous complementary evaluation procedure. Currently, this requires a member of the research community to make a grounded proposal for upgrading a specific channel from JUFO level 0 to level 1.

Summary:

- The vast majority of journals/series at all JUFO levels offer various routes to open access, such that the JUFO classification is not inconsistent with national level open access (OA) goals in Finland. JUFO level 2 and 3 journals predominantly support Green OA, while Gold OA journals are more prominent on JUFO levels 1 and 0.
- The JUFO classification also provides a relatively balanced representation of non-English language publication channels at JUFO level 2, which is especially important in the fields of Social Sciences and Humanities. Currently, JUFO level 2 includes four book publishers, as well as 23 journals and book series publishing a broad range of Social Sciences and Humanities research in the national languages (Finnish and Swedish).

4.3. Number and quota of JUFO levels

In general, the levels have two purposes in national publication channel classifications like JUFO and those in use in Norway and Denmark, for example. First, a level corresponding to JUFO level 1 indicates that the publication series or book publisher meets certain minimum criteria of a peer-reviewed publication channel aimed at the scientific community. Second, a further level, or levels, is classified to identify "leading" publication channels of the highest scientific quality and impact. Because the classification of publication channels supports a PRFS allocating funding for universities, the level system also needs to provide a balanced representation of leading publication channels across the various main fields. This can be achieved by dividing the channels into field-specific panels and establishing quotas that limit the number of channels that in each panel can be nominated to higher levels. Such quotas can be based on the share of journals and book publishers, or the article output published in the channels. Overall, the main rationale for the article output-based quotas is to take into account the size of journals (i.e. the fact that some journals may publish only a couple of dozen articles per year, while others may publish thousands).

The original model still used in Norway only has the basic level 1 and one further level, corresponding to JUFO level 2. In Finland, and later also in Denmark, the original Norwegian model has been modified by introducing a third level to the classification scheme, i.e. level 3. The addition of another "top" level has been justified by the aim of increasing the classification system's capacity to identify the very highest-level publication channels. In Finland, level 3 was introduced across all scientific fields already in the first JUFO classification published in 2012. Denmark added level 3 only in a few fields in 2019. Concerning the level quotas, title-based methods were tried at first in Denmark and Finland, but both countries later followed the example of Norway in currently using quotas based on the world production of articles. In Norway, the level 2 quota has from the outset been determined based on world output, so that in each panel the level 2 journals publish about the same share (20%) of the total world output. However, in Norway, the national output is also used to calculate quotas in fields where national journals and book publications play an important role. In Denmark,

panels were first allowed to classify the top 20% of journal titles in level 2. However, new level quotas were soon introduced, based on the total world output of articles, of which the level 2 journals were not allowed to exceed 20% (Bruun-Jensen, 2011).

4.3.1. Introduction of level 3 and volume-based level quotas in JUFO

The introduction of level 3 resulted from the method originally used for calculating the JUFO level 2 quota based on the share of journal titles (each panel could nominate at most 20% of the journals approved for level 1 to level 2). The need and willingness to further differentiate the very top journals (level 3) from other leading journals (level 2) in Finland was that many panels (especially in the fields of Natural Sciences and Medicine) considered level 2 excessively large. Level 2 was perceived to be too large because the title-based quota permitted panels to nominate a much larger number of journals/series, more than 4,000, to level 2 than was the case in Norway, where only 2,000 journals were nominated to level 2. Consequently, level 3 was introduced in 2011, which allowed the panels to nominate 25% of level 2 journals/series to level 3 (around 1,000 journals). Because the leading international channels are relatively large in the Science, Technology, Engineering, and Mathematics fields (in terms of the number of articles published annually), the title-based approach to calculating the level quota led to a much larger share of the Finnish universities' peer-reviewed outputs in Natural Sciences, Medicine, and Agriculture being published in level 2 and 3 channels than in Engineering and the Social Sciences and Humanities.

In 2014, the JUFO Steering Group considered it necessary to improve the balance of JUFO levels across the various main fields, and introduced a change to the method for calculating the level 2 and 3 quotas for journals/series. The basis for calculating level quotas was changed so that in the updated JUFO levels published in 2015, the level 2 and 3 quotas were based – as in Norway and Denmark – on the total output of articles in the world, of which the level 2 journals may not exceed 20%, and level 3 journals may not exceed more than 25% of level 2 output (i.e. 5% of total output) (Pölönen & Ruth, 2015). As a result, the number of journals/series in JUFO levels 2 and 3 was reduced from more than 4,000 to around 3,000 overall, and especially in the Science, Technology, Engineering, and Mathematics fields, the number of journals in level 2 and

3 categories was very much reduced. We will further discuss the effect of this change from the perspective of the balance between fields in Chapter 4.5.

The number of JUFO levels has been much debated in the research community and among the JUFO panels and JUFO Steering Group. After the JUFO level 3 was introduced in 2011, several panels, especially in the Social Sciences and Humanities fields, considered it difficult to distinguish confidently between the level 3 and level 2 channels. Nevertheless, all panels decided to apply level 3 for the sake of the JUFO classification's uniformity. When the updated 2015 ratings were being prepared, all the panels faced the added difficulty of choosing the level 3 channels in the framework of quotas based on publication volume and also taking into account the size of the journal. JUFO level 2 now contained a much smaller number of journals/series than in 2012. This partly removed the original need to differentiate top channels with JUFO level 3 category, as JUFO level 2 became more exclusive. In the final meeting of all panel chairs in 2014, opinions were divided for and against the need for level 3. The updated JUFO 2019 classification included both levels 2 and 3 with the same level quotas based on publication volume that were established in 2015.

4.3.2. Improvements to JUFO levels 2 and 3

In the panellist survey conducted in 2019 (Appendix 2), experts from the previous and current panels were asked five questions related to the level system: 1) how many levels are needed in the JUFO system; 2) how important and difficult is the distinction between JUFO levels; 3) what is the appropriate share of publishing volume in levels 2 and 3; 4) do publication volume-based quotas make evaluation more difficult; and 5) should the effect of publication volume be reduced?

1. Number of JUFO levels: The vast majority, 89%, of respondents answered that either four (0, 1, 2, 3) or three JUFO levels (0, 1, 2) were needed, while only a minority of experts thought that only two levels (0, 1) were sufficient, or that more than four levels were needed. Overall, 46% of respondents preferred to continue having four JUFO levels (0, 1, 2, 3), while 41% preferred reverting to three (0, 1, 2). Nevertheless, there was slightly stronger

support for three levels (51%) among the panellists from the current term 2018–2019 than for the four levels (37%), and Social Sciences and Humanities (SSH) panellists were more favourably disposed towards three levels (61% vs 28%, four levels) than those from the Science, Technology, Engineering, and Mathematics (STEM) panels (45% vs 42%, four levels).

2. Importance and difficulty of distinction between levels: Overall, the respondents considered the distinction between levels 2 and 3 the most difficult and least important, compared with the distinction between levels 2 and 1, and 1 and 0. While 35% of the panellists considered the distinction between levels 2 and 3 important or very important, 94% considered the level 1–0 distinction, and 74% the level 2–1 distinction, as important or very important. Sixty-six per cent of respondents considered the distinction between JUFO levels 2–3 difficult or very difficult, whereas only 10% considered the distinction between levels 1 and 0, and 35% between levels 1 and 2, difficult or very difficult.

3. Appropriate share of volume in levels 2 and 3: A clear majority of respondents (67%) considered that the publication volume share of JUFO level 3 should either be reduced to 0% or be increased. The most frequently proposed share was 10% (average 8%). A clear majority of respondents (63%) also considered that the publication volume share of JUFO level 2 should be increased. The most frequently proposed shares were 25% and 30% (average 26%).

4. Difficulty of using publication volume-based quotas: A clear majority of respondents, 62% (72% from STEM fields) considered that using the publication volume as the basis for the level quotas increased the difficulty of evaluation considerably or very considerably.
   Need to reduce the effect of volume-based quotas: Half (50%) of the experts who responded to the survey (61% from the STEM fields) considered that the effect of publication volume on the evaluation should be decreased.

In addition to the panellist survey, the number of JUFO levels and their share of the publication volume quota were discussed in the 23 panel meetings during the autumn of 2019 (Table 4.1.). Half the panels were for, and the other were against retaining level 3.

Table 4.1. A slight majority of JUFO Expert Panels prefer maintaining JUFO levels 3 and 2 separate. Source: discussion in panel meetings during the autumn of 2019.

Panel's view	Number of panels	Panels
Level 3 should be retained	11	4, 5, 6, 7, 9, 10, 12, 13, 14, 16, 22
Level 3 should be removed	10	1, 2, 3, 11, 15, 17, 18, 20, 21, 23
No strong opinion	2	8, 19

It can be added that in December 2019, the former chair of the JUFO Steering Group, Keijo Hämäläinen (current chair of Universities Finland), also conducted a survey of a Finnish research community on Twitter, according to which a small majority (52%) of the total of 197 respondents voted for retaining level 3 (Figure 4.3.). In all, while JUFO level 3 is controversial, there is no strong consensus among the experts, panels, and the research community regarding the need to remove or retain level 3 in the JUFO system.

There was a relatively wide consensus among the expert panellists responding to the survey and the JUFO Expert Panels that the share of publication volume in both JUFO

Figure 4.3. A slight majority of respondents in social media prefer maintaining JUFO levels 3 and 2 separate. Source: 197 respondents to a Twitter poll presented by the Chairperson of JUFO Steering Group in December 2019.

levels 2 and 3 should be increased. Indeed, some panels considered that this was a precondition for the maintenance of JUFO level 3 in the JUFO system. In the survey and in the panel discussions, it was estimated that the appropriate share of JUFO level 2 would be 25–30% of the publication volume, whereas the share of JUFO level 3 should be increased to 10%. The most important reason for increasing the share of JUFO level 2 and 3 quotas was that this would allow broad Expert Panels more room for a balanced treatment of subfields. Indeed, when asked the question "how equally does the panel's classification treat the different specialties or subfields covered by the panel?" only 39% of respondents answered that the classification was equal or very equal across the subfields.

It was also a relatively common experience of the expert panellists responding to the survey that volume-based quotas made the task of evaluation and level nomination more difficult. This was because in addition to quality, impact and prestige, as well as the equal treatment of different fields and subfields, the panels needed to consider the size of the journal. Volume-based quotas were needed to balance JUFO levels 2 and 3 across the main fields. However, it may have had the negative effect of making panels nominate to higher levels smaller journals that fitted the remaining quota. For the 2019 review of ratings, the JUFO Steering Group introduced some means for alleviating the problem:

- The largest journals consume the level 2 or 3 quota only up to a publication volume of 2,000, even if its publishing volume exceeds 2,000 (in 2015 the limit was 2,500).
- The publication volumes are rounded up to the nearest 25, which directs the attention of experts away from the smallest differences in journal size.

These measures have helped some of the panels. However, it is necessary to also consider other possible options for reducing the effect of journal size on the JUFO evaluation. One further aspect relating to the level quotas in general is that increasing the number of journals/series at level 1 increases the quota available for nominations to levels 2 and 3. This may create an incentive for the panels to accept journals to JUFO level 1, rather than to reject journals and assign them to JUFO level 0. Such

an incentive can exist when the level 2 and 3 quotas are based on the share of titles or publication volume. One possible option is to investigate if the national publication volume, as in Norway, could be used in combination with the world production to calculate the JUFO level 2 and 3 quotas.

Summary:

- While JUFO level 3 is controversial, there is no strong consensus among the research community about whether JUFO levels 2 and 3 should remain separate or not.
- There is, however, a relatively wide consensus among the expert panellists that the share of publication channels at both JUFO level 2 and 3 should be increased.

4.4. JUFO levels, quality and impact

In this section, we discuss the use of expert assessment in the evaluation of publication channels, compare the JUFO levels with external information sources to assess the coherence of JUFO levels in relation to their main tasks of 1) identifying peer-reviewed publication channels and 2) indicating the leading publication channels, and to investigate how balanced the JUFO levels are across the various fields, publication types, languages, and open access.

4.4.1. Informed expert evaluation of publication channels

It is a demonstration of trust on the part of the governments in Denmark, Finland, and Norway that the research communities within the countries, represented by the expert panellists, are involved in the construction and maintenance of the publication channel classification system, which is used in governments' funding model for universities. In each country, both panellists and researchers are actively engaged in this process, by suggesting additions and improvements to the classifications, as well as by commenting on and critiquing them. While the involvement of the research

community in the construction of the classification is an important hallmark of the legitimacy of the originally Norwegian model (Ahlgren et al. 2012), the use of an evaluation system and process based on individual experts also raises concerns about personal biases (Bornmann 2011; Haddawy et al. 2016).

In the debates concerning the involvement of experts in the evaluation of publication channels, journal impact factor (JIF) is typically presented as "a technology of distance" in a "struggle against subjectivity" (Porter 1995; Beer 2016). However, the metric characteristics of the JIF do not mean it necessarily identifies the average quality of journals more reliably or objectively than expert-based ratings. Journals are known to sometimes deliberately manipulate their JIFs by encouraging authors to cite several publications published in the same journal, for example. And even if such manipulation did not often occur, JIFs and other citation-based journal metrics would provide a rather narrow picture of journal quality – and there are also large differences between disciplines in the accuracy of this picture (e.g. due to differences in sizes and citation cultures of fields, as well as the coverage publication channels' inclusion in JIF).

In contrast, expert panellists can base their assessment of journals, conferences, and book publishers on the rich professional experience accumulated over their careers. Indeed, the panellists have gained personal experience of the standards and procedures regarding peer review and editorial decision making in various publication channels by acting as their editors, editorial board members, reviewers, and authors of published and submitted manuscripts. As active researchers, they also read, use, and cite a large number of articles and books published in different channels. Furthermore, as members of international and national research communities, they learn about the reputation of different channels in disciplinary and interdisciplinary contexts. In Finland, panellists are also encouraged to consult other specialists in the field, and individual researchers also have the option to suggest new additions and upgrades to the JUFO level. According to the 2019 survey of JUFO panellists, the personal experience of the publication channels' reputation in the research community is by far the most important consideration (Appendix 2, Figure 14).

If used with due caution, citation-based metrics and other quality indicators can also provide valuable information to assist and support the expert evaluation (Hicks et al.,

2015) of publication channels. It is also important to support expert evaluation with information on the quality and impact of channels, because the number of experts in the panels is limited, and they have personal experience of only a limited number of publication channels (Appendix 2, Figure 16). In Denmark, Finland, and Norway, the expert evaluation process of publication channels by the panellists is therefore informed by a range of impact and quality indicators. In addition to the full bibliographic information and links to websites, the JUFO expert panellists are indeed provided with an extensive suite of information, especially on journals/series:

- Inclusion in the Web of Science, Scopus, ERIH Plus, and since 2014, Directory of Open Access Journals (DOAJ).
- Level rating in the Norwegian and Danish classification
- Journals impact metrics such as the Journal Impact Factor (JIF), CiteScore, Scimago Journal Rank (SJR), and Source Normalized Impact per Paper (SNIP).
- Since 2019, inclusion in Cabell's blacklist of predatory journals (between 2014 and 2017, also Beall's list) and a list of journals removed from DOAJ for "suspected editorial misconduct".

Reliance on journal metrics can increase the legitimacy of the JUFO levels in such fields where there is a wide agreement among researchers in the field or discipline that metrics such as JIF accurately reflect the average quality, prestige, or impact of journals. However, there are large differences between fields in both the coverage and esteem of journal metrics, especially JIF. It is the task of the JUFO Expert Panels to know how citation-based journal metrics and other quality indicators and lists work in their fields and subfields. However, citation-based metrics cannot replace expert evaluation, because the sources of citation data do not provide full or balanced coverage of the leading publication channels across all fields and subfields. JUFO Expert Panels can themselves decide how much weighting to give to journal metrics in JUFO level 2 and 3 nominations; however, it is preferable that they discuss this aspect of the JUFO classification with the broader research community in their fields. Most of the information supporting the JUFO Expert Panels is also available to the members of the research community in the JUFO portal. However, the specific grounds for decisions have yet to be transparently provided.

Summary:

- JUFO panels are provided information about an extensive range of citation-based journal metrics and quality indicators regarding the publication channels to be evaluated. Yet the panels can decide themselves how much weighting to give to different indicators in level 2 and 3 assignments of the JUFO system.
- While most of the alternative journal metrics and indicators are available to the research community via the JUFO portal, specific grounds for decisions to assign channels to JUFO levels 2 and 3 are not provided.

4.4.2. Identification of peer-reviewed scholarly publication channels

One of the main purposes of the JUFO classification is to distinguish between peer-reviewed scholarly publication channels and those intended for wider science communication, i.e. for disseminating research knowledge to professional and general audiences. While this distinction is common in many kinds of evaluation procedure, it has also been shown that there is a certain degree of ambiguity in the identification of scientific/scholarly publication channels, because even experts in the field may disagree whether a given journal or book publisher applies peer review and is scholarly or not (Nederhof 1991; Burnhill & Tubby-Hille, 2003; Verleysen, Ghesquière, & Engels, 2014; Verleysen and Engels, 2015; Kaltenbrunner & de Rijcke, 2016; Mañana-Rodríguez & Pölönen, 2018).

The ambiguity in the identification of peer-reviewed channels follows from the fact that peer review practices (i.e. the number of reviewers, their anonymity, and the role of the editorial board) differ somewhat across fields, and across journal, conference, and book publishing (British Academy 2007; Verleysen & Engels, 2013; Pölönen, Guns, & Engels, 2019). The research community is also increasingly concerned about the quality of peer review. While peer review is traditionally expected to encompass the solidity, originality, and scientific importance of the reported research, some newly established open access publishers advocate a faster and less selective peer review procedure that focuses on technical solidity. At the other end of the spectrum are predatory or questionable journals that pretend but fail to carry out a proper editorial and peer review procedure to support quality control (Eykens, Guns, Rahman, & Engels, 2019; Krawczyk & Kulczycki, 2020).

The experts base their assessment of the basic JUFO level 1 criteria (specialisation in publication of research results, expert editorial board, and peer review) principally on their own expert knowledge of the reputation and operation publication channel, the information available for support assessment (e.g. inclusion in Web of Science, DOAJ, or Cabell's blacklist), and the information available on the publication channel's website. The importance of website information is often critical, especially in the case of a large share of channels considered for addition to JUFO level 1 that are not well known and well established, or included in different information sources. However, it is important to note that the distinction between level 1 and level 0 in JUFO is not based on the existence of peer review alone, because the panels may use discretion in rejecting formally peer-reviewed channels that are local, those they consider marginal from the perspective of the Finnish research community, or those they think are of questionable quality (e.g. predatory journals).

According to the 2019 survey of JUFO panellists, it is considered relatively easy to distinguish scientific/scholarly channels from those targeted at professional and general audiences. Nevertheless, it seems increasingly difficult to properly distinguish peer-reviewed and predatory journals, and to assess the relevance of the channel to Finnish research (Appendix 2, Figure 12). It is also known, based on discussion regarding the JUFO level 1 criteria in the panel meetings, that experts regularly find it difficult to properly assess newly established channels, those publishing in languages other than Finnish, Swedish, or English, and channels that do not provide transparent information on editorial and peer review practices on their websites. A comparison of various publication channel lists shows that the distinction between JUFO level 1 and 0 is not entirely consistent with the peer review status of journals/series as indicated in these lists. A certain number of journals included in Web of Science or Scopus (Figure 4.4) in level 1 or higher in Norway (Figure 4.5) and Denmark (Figure 4.6), or in DOAJ, is found at JUFO level 0. On the other hand, most journals included in the DOAJ removed list, Cabell's list, or Beall's list are currently at JUFO level 0 (Figure 4.7.). There are, however, exceptions.

Summary:

- The distinction between JUFO levels 1 and 0 is important, and the basic criteria (e.g. expert editorial board and peer-review) required from publication channels on level 1 are clear. However, there are also more subjective criteria for excluding journals from level 1 (e.g. the local, questionable, and/or marginal nature of the channel), which are based on subjective judgment of the panels. Consequently, JUFO level 0 includes rather diverse types of publication channels, and the channel-specific reasons for their exclusion from JUFO level 1 are not communicated in detail in JUFO portal.
- The main challenges in identifying the peer-reviews channels are related to the assessment of predatory journals, newly established channels, those publishing in languages other than Finnish, Swedish, or English, and channels that do not provide transparent information on editorial and peer review practices on their websites.
- The distinction between JUFO levels 1 and 0 is mainly consistent with the peer review status of journals/series as indicated by inclusion in Web of Science, Scopus, the Norwegian and Danish lists, and DOAJ, however there are also exceptions.

	JUFO Level 3	JUFO Level 2	JUFO Level 1	JUFO Level 0	All journals
■ Not in WoS or Scopus		79	5174	3458	8711
■ Web of Science	3	39	1312	360	1714
■ Scopus	5	98	2910	526	3539
■ WoS & Scopus	719	2114	11018	536	14387
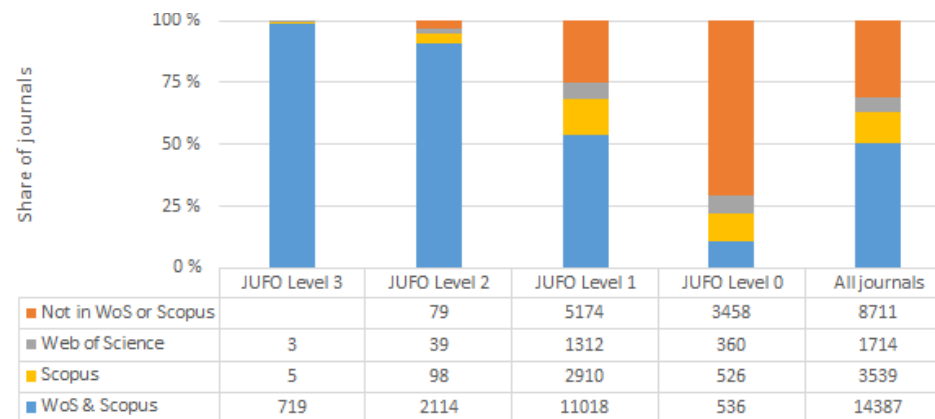
Figure 4.4. The vast majority of journals indexed in Web of Science and/or Scopus databases are included at JUFO levels 1, 2 and 3, but a considerable number remain at JUFO level 0. Almost all journals at JUFO levels 2 and 3 are indexed in WoS and/or Scopus. Total number of journals: 28,351. Source: Scopus and JUFO.

	JUFO Level 3	JUFO Level 2	JUFO Level 1	JUFO Level 0	All journals
■ No level in Norway	3	34	4327	3252	7616
■ Norway level 0	1	7	487	586	1081
■ Norway level 1	97	1245	15209	1038	17589
■ Norway level 2	626	1044	391	4	2065
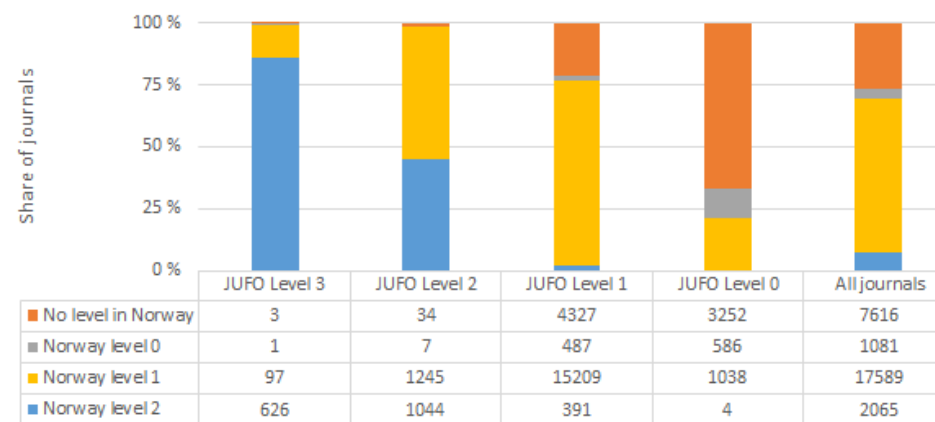
Figure 4.5. JUFO levels broadly correspond with the Norwegian level ratings of journals, but there are also discrepancies. The majority of the journals at level 2 in Norway are found at JUFO levels 3 and 2. A certain number of the Norwegian level 2 journals are at JUFO level 1, and a large number of the Norwegian level 1 journals are found at JUFO level 0. Total number of journals: 28,351. Source: Scopus and JUFO.

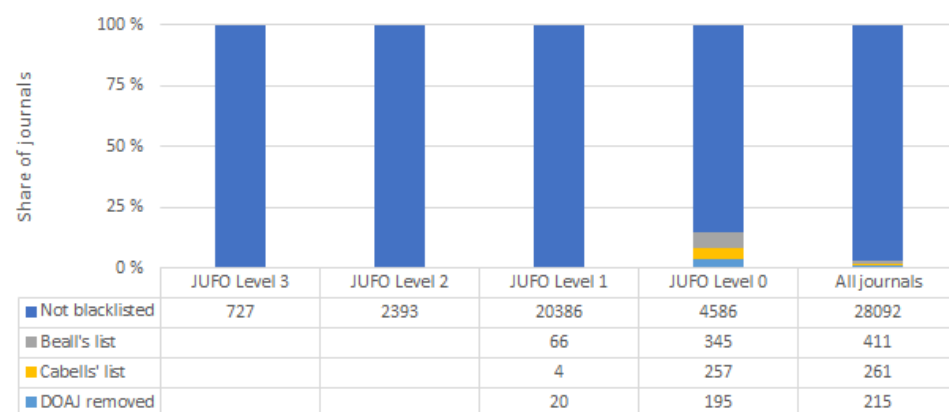|	JUFO Level 3	JUFO Level 2	JUFO Level 1	JUFO Level 0	All journals
No level in Denmark	25	149	8688	4515	13377
Denmark level 1	49	831	10869	356	12105
Denmark level 2	628	1348	857	9	2842
Denmark level 3	25	2			27
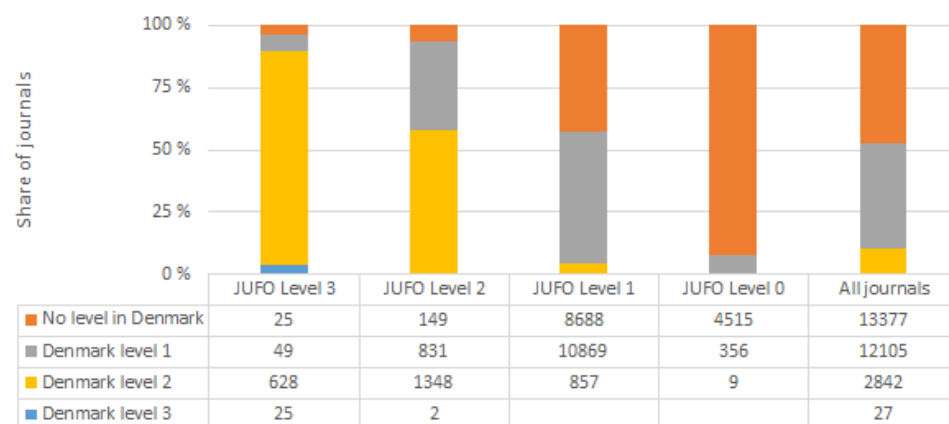
Figure 4.6. JUFO levels broadly correspond with the Danish level ratings of journals, but there are also discrepancies. The majority of the journals at levels 3 and 2 in Denmark are found at JUFO levels 3 and 2. However, a considerable number of the Danish level 2 journals are at JUFO level 1, and a certain number of the Danish level 1 journals are found at JUFO level 0. Total number of journals: 28,351. Source: Danish register and JUFO.

	JUFO Level 3	JUFO Level 2	JUFO Level 1	JUFO Level 0	All journals
Not blacklisted	727	2393	20386	4586	28092
Beall's list			66	345	411
Cabells' list			4	257	261
DOAJ removed			20	195	215

Figure 4.7. Almost all journals that are included in Cabell's and Beall's blacklists or the DOAJ removed list are classified in JUFO at level 0. The three lists overlap to some extent, so in this analysis "DOAJ removed" includes all journals from that list, "Cabell's list" includes journals not on the DOAJ removed list, and "Beall's list" includes journals not on the DOAJ removed or Cabell's lists. Beall's list has not been used as a source of information since 2017, and Cabell's list and the DOAJ removed list have been used since 2019. Total number of journals: 28,351. Source: Beall's list, Cabell's blacklist and JUFO.

4.4.3. Indication of leading and top publication channels

In addition to identifying peer-reviewed scholarly publication channels, it is the main task of the JUFO classification to identify leading (level 2) and top (level 3) journals and book publishers in terms of average quality, prestige, and impact across scientific fields. From the perspective of the Ministry of Education and Culture's funding model, the distinction between JUFO level 1 and JUFO levels 2 and 3 serves to take the average quality of the universities' publication output adequately into account. According to the 2019 survey of the JUFO panellists, the distinction between JUFO level 1 and JUFO levels 2 and 3 is also relevant and necessary in the JUFO classification. However, this task is also considered more difficult than the identification of peer-reviewed channels.

Responsibility for the JUFO classifications of the publication channels resides with the entire panel, rather than with its individual members. Especially when nominating journals/series for JUFO levels 2 and 3, the panels need to consider a wide range of issues, including the expert knowledge and indicators of journals' average quality, prestige, and impact, feedback from the research community, the balanced representation of different subfields, and the level quota framework. The panellists need to examine the journal/series from the perspective of their own field and subfield of expertise, as well as from the entire panel's perspective. The outcome is a result of dialogue and discussion between the panellists, in which voting is rarely needed to reach decisions. According to the 2019 survey of JUFO panellists, more than 85% of respondents considered it was not difficult for the panel to reach a consensus, and that they did not often personally disagree with the panel's decision (Appendix 2, Figure 10).

According to the 2019 survey of JUFO panellists, while the metrics and level ratings played an important role in the assessment, the respondents valued most highly the expert opinion of the other panellists, and their own and the research community in evaluating the quality of publication channels (Appendix 2, Figure 18). A great majority of the experts (68%) who participated in the survey felt that overall the panel's rating matched well or very well the appreciation of the scientific community in the subject

area, and only a few respondents (6%) considered that there was a poor match (Appendix 2, Figure 23). Overall, it is possible to observe that the JUFO levels largely correspond to the ranking order of journals based on Scopus CiteScore quartiles. A large majority of journals in JUFO levels 3 and 2 belong to the 1st CiteScore quartile, which contains the most highly cited 25% of journals from different field categories (Figure 4.8). Similarly, the vast majority of JUFO level 2 and 3 journals are rated at level 2 or 3 in Norway and Denmark. Nevertheless, there are also exceptions, where the JUFO panels have nominated to the higher JUFO levels journals from the lower CiteScore quartiles (or with no CiteScore) or those from level 1 in the other Nordic countries.

The evaluation of publication channels by national experts is sometimes suspected of producing national bias in the JUFO levels. In the 2019 survey of JUFO panellists, the experts were specifically asked, "How important does the panel consider choosing channels for levels 2 and 3 if the channel is much or little used by Finnish researchers?" Twenty-two per cent of the respondents indicated that the use of the channels by Finnish researchers was an important consideration, whereas 44% thought it was relatively unimportant. However, in all panels, there were respondents who assessed this question very differently, either as an important or very unimportant consideration (Appendix 2, Figure 20). Overall, it has been observed that national expert classifications, for example, from Norway (Ahlgren et al., 2012; Ahlgren & Waltman, 2014), are largely correlated with citation-based journal assessment. Saarela et al. (2016; 2020) showed that even if JUFO classifications in higher JUFO levels (2 and 3) only rarely diverged from the impact factor-based classifications or from the classifications of the other Nordic countries. In cases where they diverged strongly, journals in which Finnish researchers, or even the panellists themselves, frequently published appeared to have been somewhat favoured.

It has been regarded as an indication of a possible national bias in the JUFO classifications that the publication channels at higher JUFO levels contain a relatively large share of the Finnish publication output. For example, the Economic Policy Council report pointed out that a larger share of the Finnish universities' output (37% in 2016) than the world output (20%) was published in JUFO level 2 and 3 channels (Seuri and Vartiainen, 2018). There could be many reasons for this.

The negative explanation is that the Expert Panels might face pressure or lobbying from the research community to upgrade channels that are frequently used by their colleagues. As representatives of the research community, the experts might also feel the need to show institutional or disciplinary solidarity, or seek to promote their own field or subfield in relation to other fields. At the least, when the experts must choose between channels that might equally merit JUFO level 2 or 3, they might be tempted to select those channels that they know are important specifically for Finnish researchers instead of channels that are rarely or never used by Finnish researchers.

Especially in the fields of Social Sciences and Humanities, the great majority (66%) of expert panellists consider it important to nominate leading Finnish- and Swedish-language channels to JUFO level 2 (Appendix 2, Figure 24). Because the national language channels nominated to JUFO level 2 have no impact factors or level 2 ratings in Norway and Denmark, it is also possible to regard these cases as a form of national bias. The national language journals and publishers represent a very small share of the world output but have a strong concentration of publications from Finland.

As regards the international channels, a possible explanation is that Finnish researchers publish, on average, more frequently in high-quality publication channels than the world's researchers in general. Indeed, our analysis shows that a much larger share of the Finnish than the world publication output is concentrated in the journals belonging to the 1st CiteScore quartile (Figure 4.9). Therefore, while it may be impossible to avoid all personal or collective bias in expert evaluation, the larger share of Finnish output in JUFO level 2 and 3 channels is also to be expected. There are no indications that the JUFO levels result in a severely biased measure of the quality of the Finnish universities' publication output.

The scientific community itself can promote the integrity of the JUFO evaluation by nominating members and providing feedback to the JUFO panels. JUFO is a regularly updated classification system. JUFO levels 2 and 3 are reviewed every four years, and it is also possible for the scientific community to propose corrections to the JUFO classifications between the reviews. The panel compositions are also changed

every four years, meaning that a considerable share of new experts is introduced to the panels. The evaluation work itself must be based on good scientific practice (honesty, general care, and accuracy), and JUFO panellists are urged to declare engagements (if any) with the evaluated channels. Panel members are responsible for complying with the National Board of Re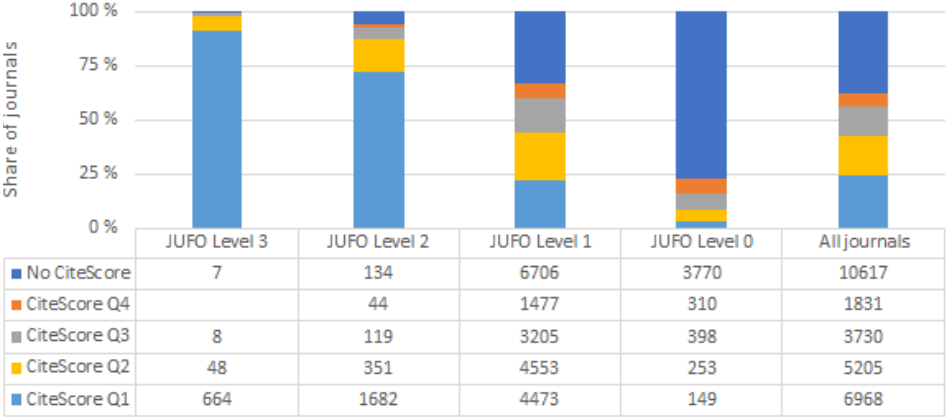search Ethics Guidelines for Responsible Conduct of Research, the principles of which are universally accepted by the Finnish universities and research institutes.

Summary:

- Overall, JUFO levels broadly correspond to Scopus CiteScore quartiles that represent the ranking order of journals based on their average relative citedness across different scientific fields. Similarly, the vast majority of JUFO level 2 and 3 journals are also rated at level 2 or 3 in Norway and Denmark.
- While it is impossible to avoid all personal or collective bias in expert evaluation, there are no indications of severe national bias that would compromise the validity of JUFO classifications as a measure for the average quality of the Finnish universities' publication output.
- The scientific community itself can promote the integrity of the JUFO evaluation by nominating members and providing feedback to the JUFO panels. In their expert task, JUFO panellists are responsible for complying with the National Board of Research Ethics Guidelines for Responsible Conduct of Research.

	JUFO Level 3	JUFO Level 2	JUFO Level 1	JUFO Level 0	All journals
■ No CiteScore	7	134	6706	3770	10617
■ CiteScore Q4		44	1477	310	1831
■ CiteScore Q3	8	119	3205	398	3730
■ CiteScore Q2	48	351	4553	253	5205
■ CiteScore Q1	664	1682	4473	149	6968

Figure 4.8. JUFO levels broadly correspond with the Scopus CiteScore ranking order of journals, but there are also discrepancies. For example, Q1 includes the most highly cited 25% of journals from different field categories. Total number of journals: 28,351. Source: Scopus and JUFO.
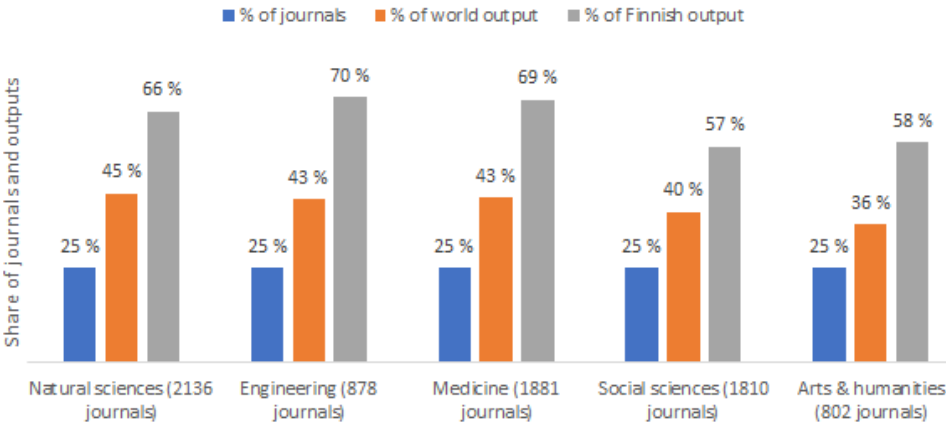
Figure 4.9. No severe national bias is present in JUFO: Similarly as an above-world-average share of publication output from Finland is published in top JUFO level channels, an above-world-average share of publications from Finland also falls in channels categorized by Scopus as the most cited 25% (1st CiteScore quartile). Analysis includes 7,038,155 articles published 2014-2016 in 22,606 Scopus indexed journals, of which 5,837 belong to the 1st CiteScore quartile. Number of Finnish publications 2014-2016: 49,839. Source: Scopus and VIRTA Publication Information Service.

4.4.4. JUFO levels of Academy of Finland-funded research

In this section, we report the main result of a yet unpublished study in which the research performance of Academy of Finland (AoF)-funded research is compared to the 14 Finnish universities based on JUFO levels (Pölönen & Auranen, 2020). The Academy of Finland is Finland's major public research funding agency. It uses international expert evaluation to select high-quality research projects for funding. Earlier bibliometric analyses based on Web of Science data have shown that AoF-funded publications have a higher Top10 index (indicating the share of outputs among the top 10% most highly cited papers) than publications from Finland on average: 1.36 compared to 1.09 in 2019 (1=world average). The Top10 index for Academy Research Fellows is also usually higher than for Academy Projects: 1.52 vs 1.30 in 2019 (Auranen & Leino, 2019).

This study used the Finnish universities' 98,472 peer-reviewed publications (2015–2017) from the VIRTA Publication Information Service as data, of which 5,478 (5.6%) were AoF-funded research outputs from the call years 2011–2013, including 3,892 (4%) outputs related to Academy of Finland projects and 1,681 (1.7%) to Academy of Finland fellows. Overall, both the universities' peer-reviewed output and the AoF-funded research were published in channels rated at all JUFO levels, from levels 0 to 3. However, the AoF-funded research was much more concentrated in the JUFO level 2 and 3 channels than the Finnish universities' publication output in general in all the main fields (Figure 4.10). In addition, AoF-funded fellows produced a larger share of JUFO level 2 and 3 outputs than AoF-funded projects. JUFO levels and citation analysis thus produce highly consonant results with regard to average quality AoF-funded research compared with the Finnish universities' output.

Summary:

- JUFO levels are consistent with qualitative evaluations of research projects by international experts of the large research funder the Academy of Finland; the share of research published in publication channels at the highest JUFO levels (2 and 3) is much larger for publications stemming from research projects funded by the Academy of Finland (and evaluated as high-quality projects by international expert panels) than for all publications produced by Finnish universities overall.
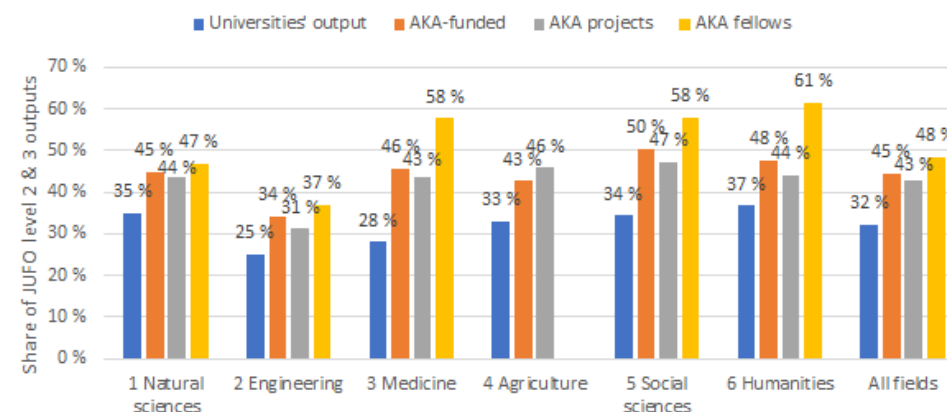
Figure 4.10. JUFO's top levels broadly correspond with qualitative evaluations of project quality by Academy of Finland: A larger share of publications originating from research funded by the Academy of Finland is published in JUFO level 2 and 3 channels than the Finnish universities' peer-reviewed publication output in general (2015–2017). Total number of outputs: 98,472. Source: VIRTA Publication Information Service, Academy of Finland and JUFO.

4.4.5 JUFO levels and scientific impact of research

In this section, we present the results of the citation analysis of 8,959,669 Web of Science publications from 2011–2015 to compare the scientific impact of outputs from Finland and the world as a whole published in the international journals indexed in WoS and nominated in 2019 to JUFO levels 0, 1, 2, and 3.

An analysis of Web of Science publications published in 2011–2015 shows a considerably stronger citation impact for articles published in journals with a higher JUFO level than journals with lower JUFO levels (Pölönen & Sivertsen, 2017; for a more complete report of an earlier analysis, see Auranen & Pölönen, 2012; Auranen et al., 2013; and for a similar analysis for Norway, see Aksnes, 2017). Journal selection can clearly be associated with citation advantage, just as open access can (compare Piwowar et al., 2019). The advantage of outputs in higher JUFO level journals in terms of scientific impact can be observed using both the MNCS and Top10 indicators:

- MNSC, the Mean Normalized Citation Score, which measures the average number of citations compared to other publications published in journals from the same field category
- Top10 index, which measures the share of outputs among the 10% of the most highly cited publications published in journals from the same field category

The Finnish and world output published in JUFO level 2 and 3 journals across all fields have a scientific impact much higher than the world average (Figure 4.11). By contrast, the scientific impact of Finnish and world output at JUFO level 1, and especially 0, is well below the world average. In JUFO level 2 and 3 journals, the world outputs as a whole slightly outperform the Finnish research, while the opposite is true at JUFO levels 1 and 0. Overall, the differences in scientific impact between output published in higher JUFO levels than lower JUFO level journals are observed across all JUFO panel fields reasonably covered in WoS (Figure 4.12). However, in some panel fields, the differences in scientific impact between JUFO levels 2 and 3 are stronger than in some other fields.

Although the JUFO levels are correlated with citation analysis at macro level, it is important to remember that JUFO levels do not predict the citation counts of individual papers any better than Journal Impact Factors (JIF). Individual highly cited and uncited papers among the Finnish articles and those of the world as a whole are published in journals at all JUFO levels. JUFO levels, like JIFs, are inappropriate measures of the quality of individual outputs.

Citation analysis based on the Web of Science enables us to analyse only the relationship between JUFO levels of journals and the scientific impact of research. Especially in the Social Sciences and Humanities, a large share of original research is published in books, and in the JUFO classification, their level is mostly determined based on the book publisher. A recent study, comparing 743 monograph titles from Denmark, Finland, and Norway, discovered that the monographs published in 2017 by higher level publishers (level 2 or 3) had considerably larger average visibility, as measured by WorldCat library holdings, than those published by level 1 publishers (or in Finland, by level 0 publishers). However, the publisher level was not a strong predictor of the visibility of individual monographs (Zuccala et al., 2020).

Summary:

- JUFO levels are highly consistent with citation-based analysis; the average citation impact of publication output published in channels classified at higher JUFO levels is significantly higher than the average impact of publication output published in the channels of the lower JUFO levels.
- Selecting high-quality publication channels can contribute to the scientific impact of Finnish research. Any remaining personal or subjective biases of expert evaluation underlying the JUFO levels of individual journals is of relatively marginal importance from the macro perspective.
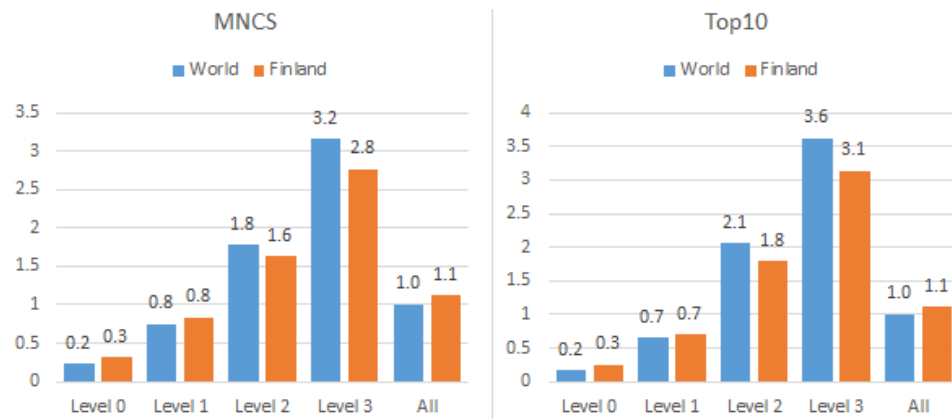
Figure 4.11. Citation impact of the Finnish output published at higher JUFO levels is consistently stronger than the citation impact of output in lower JUFO level journals (2011–2015). Number of publications (WoS): 8,959,669. Citation analysis: Yrjö Leino, CSC. Source: Web of Science, Clarivate analytics.
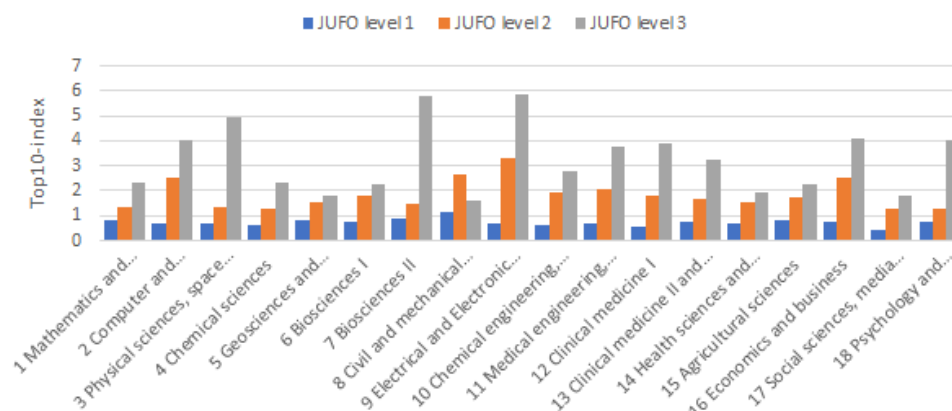

Figure 4.12. Stronger citation impact of Finnish research published in higher JUFO level journals is observed across all the panel fields (2011-2015). Number of Finnish publications: 46,733. Citation analysis: Yrjö Leino, CSC. Source: Web of Science, Clarivate analytics.

4.5. Balance across fields and publication types

In this section, we investigate, based on the VIRTA data, the average number of publication points peer-reviewed outputs produce according to the weights used between 2017 and 2019 in the Ministry of Education and Culture funding model publication indicator (Table 4.2). The average number of publication points is equivalent to the average value of peer-reviewed outputs to universities in the Ministry of Education and Culture funding model. The purpose of this section is to assess the overall neu-trality of the Publication Forum classification across fields, as well as publication types, languages, open access and multidisciplinary research using JUFO levels valid in 2012–2014, 2015–2018, and 2019–2022.

Table 4.2. The funding model of Ministry of Education and Culturefor Finnish universities puts substantial weight on publication output in publication channels classified at JUFO levels 3 and 3.

Publication type	JUFO level 0	JUFO level 1	JUFO level 2	JUFO level 3
Peer-reviewed articles in journals, conferences and books, and edited works	0.1	1	3	4
Peer-reviewed monographs	0.4	4	12	16

Overall, the neutrality of JUFO levels as a quality indicator across different fields has increased (Figure 4.13). In 2012–2014, the number of journals/series in JUFO levels 2 and 3 was determined based on the share of titles: in each panel, JUFO level 2 could comprise at most 15% and level 3 at most 5% of all JUFO level 1–3 titles. Using JUFO levels 2012–2014, peer-reviewed outputs produced on average many more publication points in Natural Sciences (2.1), Medicine (2.2), and Agriculture (2.1) than in Engineering (1.3), Social Sciences (1.5), and Humanities (1.7).

The differences between fields have diminished since the introduction in 2015 of JUFO level 2 and 3 quotas, which are based on the publication volume that takes the size of journals into account. On average, outputs produce 1.8 publications points, though fewer in Engineering (1.5) and more in Humanities (2.0). JUFO levels updated

in 2019 are also based on publication volume quotas. The differences between fields therefore also remain more neutral across fields than the 2012–2014 JUFO levels.

There are some notable differences between publication types (Figure 4.14). Monographs produce an average of four times more publication points per output than articles, because they are given a four times larger weighting in the Ministry of Education and Culture funding model. Monographs were less productive in 2012–2014, because it was only in 2015 that book publishers were nominated for JUFO level 3. Although the differences in the average number of publication points between different types of article have also slightly diminished, conference articles remain the least productive publication type, while book articles have become slightly more productive of publication points than journal articles. The difference between Engineering and other fields is indeed largely due to conference articles, because the journal or book publication output in Engineering is equally as productive as other fields (Figure 4.15). The small advantage of Humanities is probably due to articles in books and monographs.

Overall, the differences between publication languages in the average number of points per output are relatively small. In all fields, the English-language monographs and articles in books are on average the most productive type of output (Figure 4.16). It is noteworthy that especially in the fields of Social Sciences and Humanities, in which multilingual scholarly communication remains an important pattern, the average number of points for English- (1.7), Finnish- (1.7), and Swedish- (1.6) language peer-reviewed articles in journals is practically the same, making these outputs equally valuable to universities (Figure 4.17). Publications in languages other than English, Finnish, and Swedish represent only a small share of the Finnish universities' output, and in all publication types, these other publication languages are disadvantaged in terms of the average productivity of JUFO points (see also Pölönen et al., 2018).

Gold OA publications produce a smaller average number of points per output (1.3) than Hybrid (2.0) and self-archived only Green OA publications (1.9) or closed publications (1.9) (Figure 4.18; similar differences have been observed with regard to
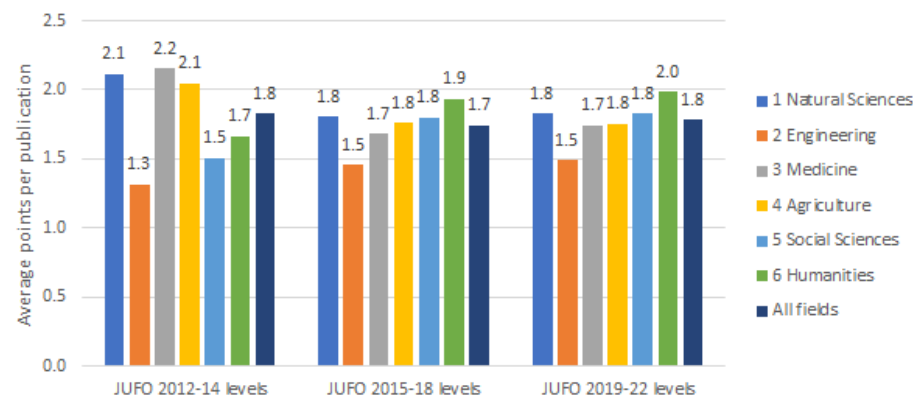
Figure 4.13. On average, peer-reviewed publication outputs from the various main fields yield a fairly similar amount of publication points per output, and the differences have become smaller since 2015. JUFO levels 2012–2014 are applied to outputs published in 2011–2014, and JUFO levels 2015–2018 and 2019–2022 are applied to outputs published in 2015–2017. Total number of outputs: 184,105. Source: VIRTA Publication Information Service.

citation impact: Piwowar et al., 2018; Pölönen, 2018b). The availability of high-quality OA journals differs between fields, as does the availability of funding for OA costs (notably APC for gold and hybrid OA). It can be seen that the average JUFO points per output are considerably higher for gold OA publications in the Natural Sciences compared with other fields. In the Humanities, self-archived and closed outputs are on average more productive of JUFO points compared with both gold and hybrid OA. From 2021, the average point value of all types of OA publication will be increased by 20% compared to the closed outputs in the Ministry of Education and Culture's funding model.

Multidisciplinary publications produce on average the same or higher number of points per output than publications with only one field (Figure 4.19). It is difficult to measure publications' multidisciplinarity and interdisciplinarity. In the case of publication data from the VIRTA Publication Information Service, it is possible to calculate the number of fields (1–6) that researchers have indicated for their publications at the time of registering in the university's local CRIS. Even if individual researchers

and universities have somewhat different practices for registering fields (see Chapter 6.8), the number of indicated fields can be used as a tentative measure of multidisciplinarity. It seems that using JUFO levels as a quality indicator does not undervalue multidisciplinary research (Muhonen et al., 2016).

Summary:

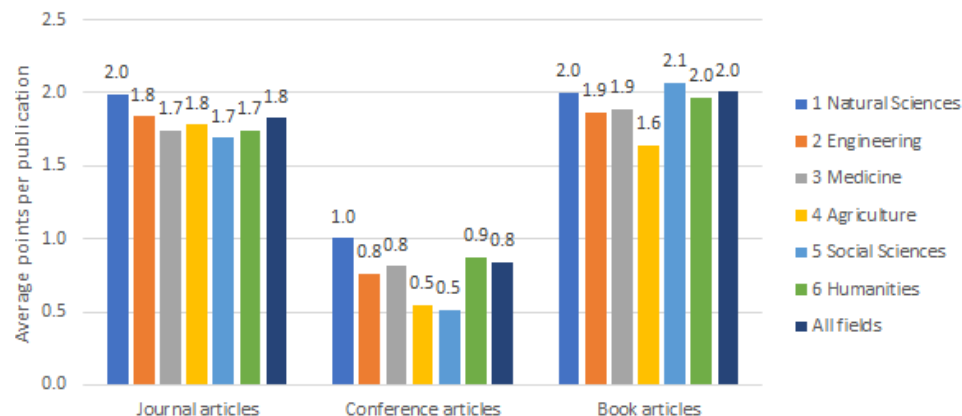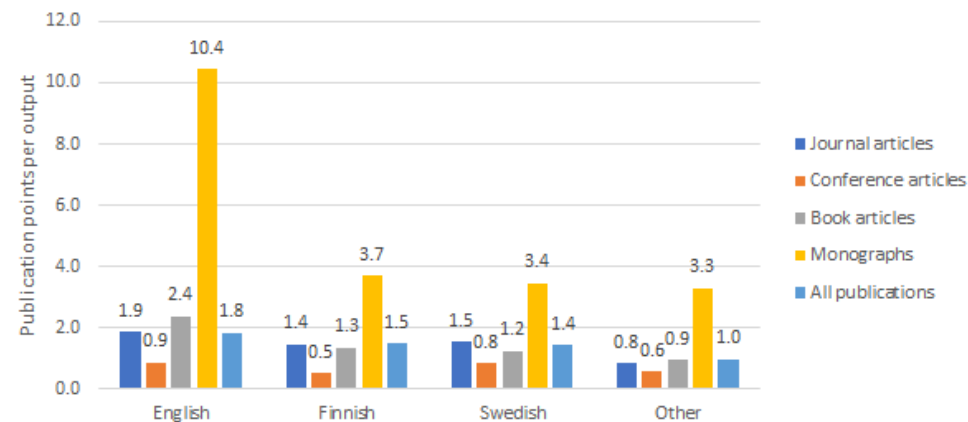- Overall, JUFO levels operate as a relatively neutral quality indicator across the main fields of science, such that scientific fields or universities operating in different fields are not substantially advantaged or disadvantaged because of their profiles. The neutrality of JUFO levels across various fields further increased in 2015, asthe calculation of JUFO level 2 and 3 quotas began to be based on publication volume instead of number of titles.
- On average, peer-reviewed publication output yields 1.8 publication 'points' for a Finnish university (in the JUFO level-weighted funding model of Ministry of Education and Culture). Among different fields, the average publication points are slightly lower in Engineering (1.5) and slightly higher in Humanities (2.0). The lower average number of points in Engineering is mainly due to the relatively large share of conferencepublications in Engineering (which are broadly covered but less highly valued on average), while the higher number of points in Humanities is mainly due to book publications, especially monographs.
- Differences in the average number of points per output are relatively small between different publication languages.
- On average, Gold OA publications produce the smallest number of points per output, while Hybrid and Green OA publications and closed publications are equally productive. However, there are some differences between fields in the average number of JUFO publication points yielded by OA publications between fields.
- Multidisciplinary publications produce the same or higher number of points per output on average than publications with only one field. This indicates that using JUFO levels as a quality indicator does not substantially undervalue multidisciplinary research.
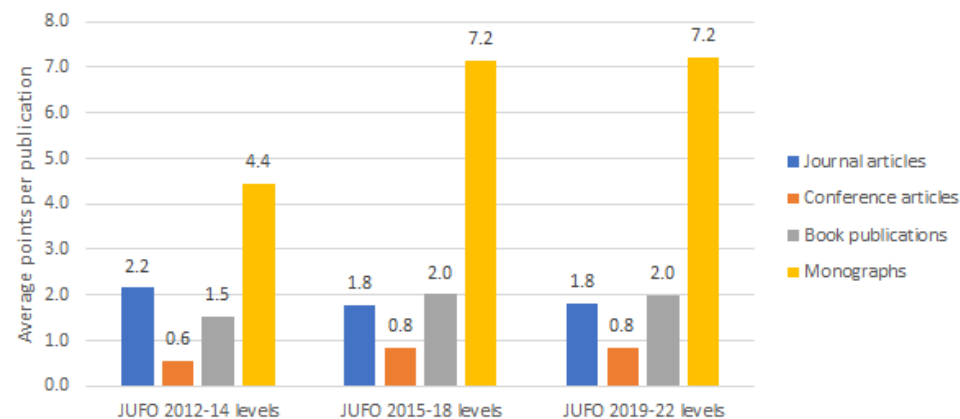
Figure 4.14. Peer-reviewed monographs produce the largest and conference articles the smallest average amounts of publication points per output. The average points yielded by monographs and book publications (including chapters and edited volumes) increased in 2015 due to the inclusion of book publishers in JUFO level 3. JUFO levels 2012–2014 are applied to outputs published in 2011–2014, and JUFO levels 2015–2018 and 2019–2022 are applied to outputs published in 2015–2017. Total number of outputs: 184,105. Source: VIRTA Publication Information Service.

Figure 4.16. When all fields are counted together, the differences in the average number of JUFO publication points yielded by publications of different languages are relatively small. English-language monographs and articles in books are the most productive type of output on average. Publication points were calculated based on 2019–2022 JUFO levels applied to outputs published in 2015–2017. Total number of outputs: 82,097. Source: VIRTA Publication Information Service.

Figure 4.15. The differences in average JUFO publication points yielded by different publication types are fairly consistent across fields. Publication points were calculated based on 2019–2022 JUFO levels applied to outputs published in 2015–2017. Total number of outputs: 82,097. Source: VIRTA Publication Information Service.
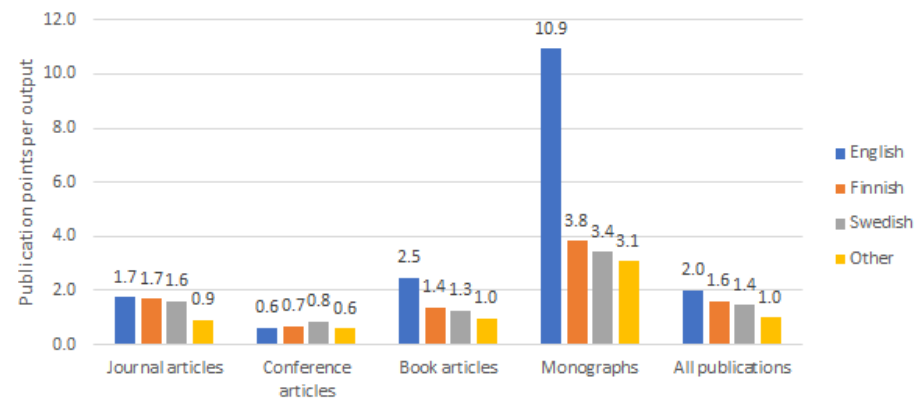
Figure 4.17. In the Social Sciences and Humanities, English-, Finnish-, and Swedish-language articles in journals are approximately equally valuable to universities in terms of the average number of JUFO publication points per output. However, English-language monographs and articles in books have an advantage compared with book publications in Finnish, Swedish, and other languages. Publication points were calculated based on 2019–2022 JUFO levels applied to outputs published in 2015–2017. Total number of outputs: 26,278. Source: VIRTA Publication Information Service.
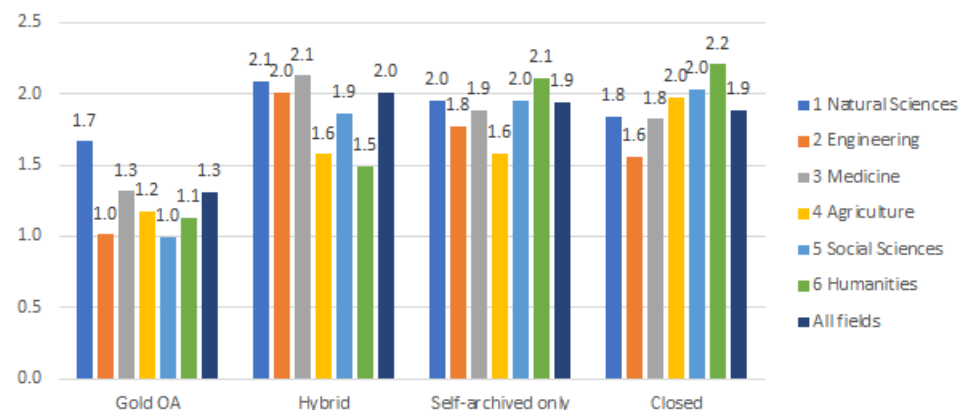
Figure 4.18. On average, Gold OA publications yield a smaller number of JUFO publication points per output than Hybrid and Green (self-archived only) OA publications or closed publications. Publication points were calculated based on 2019–2022 JUFO levels applied to outputs published in 2015–2017. As of 2021, the average point value of all types of OA publication will increased by 20% compared with closed outputs. Total number of outputs: 82,097. Source: VIRTA Publication Information Service.
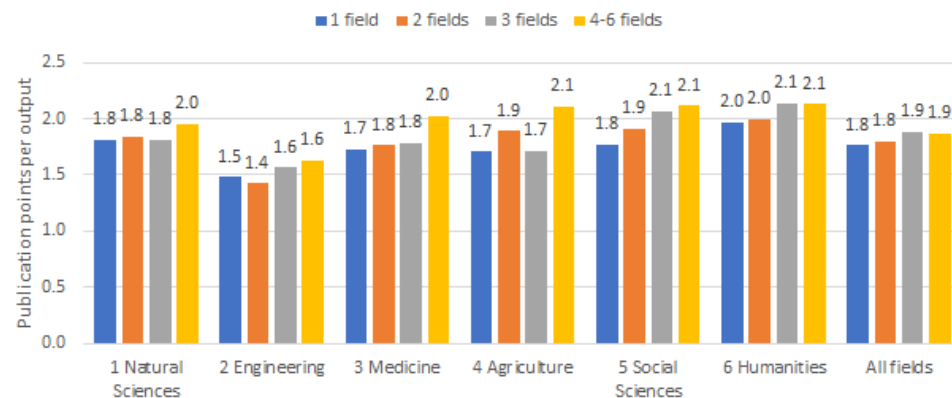
Figure 4.19. On average, Multidisciplinary publications yield a slightly higher number of JUFO publication points per output than publications with only one field. Researchers can indicate 1–6 fields for their publications registered to local CRIS, from which the data are integrated to the VIRTA Publication Information Service. Publication points were calculated based on 2019-2022 JUFO levels applied to outputs published in 2015-2017. Total number of outputs: 82,097. Source: VIRTA Publication Information Service.

5. Uses of JUFO classifications

Summary:

Question 4. For what purposes is the JUFO classification used in the scientific community in Finland?

Key take-aways:

- Since 2015, the Ministry of Education and Culture has used JUFO levels as a quality indicator of the publication output to determine part (14% in 2021-2025) of the Government funding of Finnish universities. The JUFO system provides a scientific community-curated, regularly updated, comprehensive and transparent quality measure for the funding model. The model also promotes quality by encouraging the scientific community in Finland to publish research results in publication channels with demanding peer reviews and reaching the widest critical expert audience.
- Finnish universities use the JUFO levels to monitor and develop their publishing activities, fund allocation between faculties and/or departments, and in some instances, for evaluation purposes at the individual level. As in Denmark and Norway, the national publication channel rating is used as an assessment tool more often in the Social Sciences and Humanities than in the other fields.
- Universities use JUFO levels in institutional research assessment exercises to complement Web of Science- or Scopus-based citation analyses (e.g. as background information supporting Expert Panel assessment). The national publication data and JUFO levels could also be used to increase the coverage of fields, publication types, and languages in other macro-level analyses (e.g. the "State of Research in Finland" analyses of the Academy of Finland).
- The limitations of JUFO levels as a quality indicator need to be considered in all uses of JUFO levels in evaluations by organisations performing and funding research. To promote a responsible assessment culture, including the responsible use of JUFO levels, research performing and funding organisations need to commit to the National Recommendations for "Good Practice in Researcher Evaluation" and follow the "User Guide for the Publication Forum Classification".

In this section, we describe and discuss the different uses of the JUFO levels in the Finnish research community, including its main application in the Ministry of Education and Culture's funding model, as well as secondary uses especially by the research organisations in different evaluation contexts.

The Finnish scientific community consists of a wide range of organisations performing and funding research that regularly evaluate units and individuals. In 2019, 13 universities and 23 universities of applied sciences operated under the Ministry of Education and Culture. Research is also conducted in 12 state research institutes governed by various ministries, as well as in other institutions, university hospitals, and private companies. Universities produce roughly 70% of Finland's research output (Academy of Finland, 2018). The Ministry of Education and Culture plays an important role in steering the higher education system, because the annual core funding from the state covers 58% of the universities' budgets (Table 5.1). The main national research funding agency for high-quality basic research, the Academy of Finland, also operates under the Ministry of Education and Culture's funding and governance (Arnold et al., 2013). In addition, many other funders of basic and applied research operate at the national level in Finland, such as Business Finland (formerly TEKES) for R&D projects, as well as a considerable number of private foundations (Tiitta 2018).

In considering the different uses of the JUFO classification, it is important to note that there are several research evaluation and funding procedures that regularly concern the Finnish universities and their academic personnel: performance-based government funding of institutions, institutional research assessments, funding

schemes, and human resources management, as well as competitive project funding for individuals, groups, and consortia by national and international agencies.
To these can be added the peer review of manuscripts for publication organised by international and national journals and book publishers. All these evaluation processes are in many ways intertwined. For example, success in gaining Academy of Finland funding influences the universities' share of performance-based government funding, and it may also be considered in institutional research assessments, funding, and career promotion procedures. Peer-reviewed publications typically inform performance-based funding of institutions, institutional research assessments, funding schemes, and career assessment, as well as project evaluations by the funding agencies.

The JUFO system was originally developed for the evaluation of the average quality of a large number of publications produced by universities, especially for use in the funding model of the Ministry of Education and Culture. The Universities Finland working group already envisaged other potential interests and uses for the information provided by the JUFO system (Universities Finland, 2010):

- The university's internal information interest, e.g. benchmarking in relation to other similar universities (nationally and internationally), publication profiles of departments, development of the university's internal funding model
- Influencing the researcher's choices by making the average quality level of the publication channels visible
- Supporting research evaluation in research assessment exercises the universities conduct themselves every few years, for example
- Reports on the State of Research in Finland produced periodically by the Academy of Finland.

Table 5.1. The majority of funding of Finnish Universities comes from Ministry of Education and Culture. Source: Ministry of Education and Culture, 2018 (2017 figures)

Funding	Billion euros	Share
Ministry	1,647	58%
Academy of Finland	302	11%
EU	105	4%
Other funding agencies	299	11%
Other	488	17%
All funding	2,841	100%

5.1. Ministry of Education and Culture

Since 2015, the Ministry of Education and Culture has used JUFO levels as a quality indicator of the publication output to determine the distribution of part of the annual core funding for Finnish universities. As a broad range of education and research indicators is used in the funding model, the publications and JUFO levels do not alone determine the funding of universities. In the current funding model, in use until 2020, the allocation of 41% of the core funding is based on educational performances, 33% on research performance indicators, and 28% on other policy considerations. One of the four research indicators is the quality-weighted count of scientific publications (share 13%) (increasing to 14% in 2021). The other three research indicators are PhD degrees, international teaching and research staff, and competed research funding.

Comparisons between countries have shown that the Finnish performance-based funding model is based on indicators to a relatively large extent, and the share of research performance is also strong (European Commission, 2018; Kivistö et al., 2019). In Norway, the publication indicator reallocates less than 2% of the total expenses in the Higher Education Sector (Sivertsen, 2018), while in Denmark, approximately

6% of the total amount of core funding in 2018 was distributed on the basis of publication points (Aagaard, 2018). In Finland, 13% of the universities' core funding is allocated on the basis of the publications, and the share will be increased to 14% in 2021 (Ministry of Education and Culture, 2018). The publication indicator distributes more than 200 million euros annually. It has been estimated that a peer-reviewed article in a JUFO level 1 journal is worth approximately €4,200 to universities (Seuri & Vartiainen, 2018).

In the Ministry's funding model, the unit of assessment is always the university as a whole, not a faculty, department, unit, or researcher. The JUFO levels are used to calculate funding based on a three-year average count of publications, including around 75,000 peer-reviewed outputs produced by the Finnish universities during the three previous years (e.g. the funding for 2015 is calculated based on 2011–2013 publications). A publication-specific expert evaluation of around 25,000 new peer-reviewed outputs produced annually would constitute an unreasonable amount of work. The expert evaluation in the JUFO process therefore concerns the publication channels, not individual publications. The JUFO system provides the funding model with a community-curated, regularly updated, comprehensive, and transparent measure of the average quality of the universities' diverse publication outputs to inform funding distribution. The publication data also enable a comprehensive monitoring of changes that occur in publishing (see analyses in Chapter 6). Besides funding allocation, the JUFO levels promote quality by encouraging the Finnish scientific community to publish research results in publication channels that are valued by the scientific community, demanding in terms of peer reviews, and reach the widest critical expert audience.

In addition to the funding model for universities, the Ministry of Education and Culture uses the information based on the VIRTA publication data and the Publication Forum ratings for monitoring the research performance of the universities. Since 2010, the Ministry's spending proposals submitted to the Ministry of Finance for the formulation of the state budget have included quantitative research performance targets for the universities collectively. Since 2016, targets have been set for the number of scientific level 2 and 3 publications per academic staff member (FTE), as

well as the international co-publications' share of scientific JUFO level 1–3 publications (Pölönen, 2018a).

Summary:

- Since 2015, the Ministry of Education and Culture has used JUFO levels as a quality indicator of the publication output to determine part of the Government funding of Finnish universities. As a broad range of education and research indicators are used in the funding model, the publications and JUFO levels do not alone determine the funding of universities.
- In the Ministry's funding model, the unit of assessment is always the university as a whole, not a faculty, department, unit, or researcher. A publication-specific expert evaluation of around 25,000 new peer-reviewed outputs produced annually would constitute an unreasonable amount of work. The expert evaluation in the JUFO process therefore concerns the publication channels, not individual publications.

The JUFO system provides a scientific community-curated, regularly updated, comprehensive and transparent quality measure for the funding model. The model also promotes quality by encouraging the scientific community in Finland to publish research results in publication channels with demanding peer reviews and reaching the widest critical expert audience.

5.1.1. Funding model publication indicator

The publication indicator is similarly constructed in Finland, Denmark, and Norway: the calculation of funding is based on the complete publication data collected annually from the universities, the publication outputs are weighted according to the publication type and level of the publication channel, and each university's share of funding is determined directly by the fixed funding formula based on the differentiated publication counts. However, there are considerable differences in detail between the Nordic countries in how the quality levels of publication channels are used in the funding model 1) to delineate publications included in the publication indicator and 2) to weigh different types of publication. In addition, 3) the method for counting publications in Finland differs from Norway and Denmark. Whereas in Norway and Denmark, the same body is responsible for the development of the quality classification of publication channels and their use in the publication indicator, in Finland, these tasks are divided between JUFO and the Ministry of Education and Culture working groups. Adjustments to the JUFO system, publication weights, and counting methods require coordination and dialogue between JUFO and the funding model working groups.

Concerning (1), the delineation of publications taken into account in the funding model, the practice in Norway and Denmark differs greatly from Finland. In Norway and Denmark, metadata of all peer-reviewed and non-peer-reviewed outputs may be collected in the local/national research information systems. However, the national publication channel lists are used to exclude outputs not published in peer-reviewed publication channels approved at least to level 1 from the publication indicator (Sivertsen, 2018; Aagaard, 2018). In Finland, the peer review status of outputs is currently determined by the universities based on researchers' self-reports (often validated by data collection personnel), and the JUFO levels are not used to exclude outputs from the funding model but only to differentiate their value in terms of funding. Unlike in Norway and Denmark, outputs published in JUFO level 0 channels, as well as publications for professional and general audiences, are also taken into account with a small weighting (Pölönen, 2018a; Pölönen, Guns & Engels, 2019). The specific purpose of including non-peer-reviewed publications in the funding model in Finland has been to reward societal interaction (Ministry of Education and Culture, 2014).

Concerning (2), the weighting of outputs, the publications are given different weights by the publication type and level in Denmark, Finland, and Norway (Tables 5.2, 5.3, and 5.4). In all three countries, the publication indicator makes a similar differentiation between articles in journals, conferences, and book series with ISSN in levels 1 (1 point) and 2 (3 points). Level 3 articles, which are restricted in Denmark only to a few fields, are given a stronger weighting in Denmark (5) than in Finland (4). However, in Denmark and Norway, book articles assigned to levels 1 and 2 based on the book publisher ISBN are treated differently from book articles in series with an ISSN. Articles in books with only an ISBN (probably the majority of book articles) are given smaller weighting in Denmark (0.5–2 points) and Norway (0.7–1 points) than in Finland (1–3 points). At level 1, monographs are given stronger weighting than articles in Denmark and Norway (5 points) than in Finland (4 points). However, in Finland, the weighting of level 2 is stronger (12 points compared with 8 points in Denmark and Norway). Only Finland awards level 3 to monographs (16 points), and in 2021, an extra weighting of 20% for all types of open access peer-reviewed publications will be introduced.

Table 5.2. Approximately similar publication weighting are used for peer-reviewed articles in serials (journals, conferences, and book series) with an ISSN in Finnish, Danish, and Norwegian funding models.

Level	Denmark	Finland	Norway
1	1	1	1
2	3	3	3
3	5	4	-
0	-	0.1	-

Table 5.3. Somewhat higher publication weighting are used for articles/chapters in books based on publisher ISBN in Finnish* funding model than in the Danish, and Norwegian funding models.

Level	Denmark	Finland	Norway
1	0.5	1	0.7
2	2	3	1
3	-	4	-
0	-	0.1	-

* includes edited works

Table 5.4. Somewhat higher publication weightings are used for peer-reviewed monographs in the Finnish funding model than in the Danish, and Norwegian funding models.

Level	Denmark	Finland	Norway
1	5	4	5
2	8	12	8
3	-	16	-
0	-	0.4	-

The publication counting methods (3) are important, because fields differ considerably in co-authorship practices. For example, the share of co-authored publications, the average number of co-authors, and the number of different universities represented by the co-authors is larger in Medicine than in the Humanities. In Finland, institutional-level whole-counts are used, meaning co-publications with authors from several Finnish universities are counted more than once in the funding model. Furthermore, the number of authors is not considered, meaning that an output always produces the whole amount of points for the university, regardless of its share of contributing authors. In practice, the weighting of an output, which is determined by publication type and JUFO level, is multiplied by the number of Finnish universities that have co-authored the output. Fractionalisation of points between universities or according to the universities' shares of contributing authors has been discussed in Finland but has not been adopted in order not to discourage collaboration (Ministry of Education and Culture, 2014).

In Norway and Denmark, the fractional counting of publications has been considered relevant from the perspective of the fair treatment of different fields, but it may also encourage or discourage collaboration (Sivertsen, Rousseau & Zhang, 2019). In Norway, the points for co-publications are fractionalised among the participating Norwegian institutions according to their number of contributing authors, also taking foreign co-authors into account. Since 2015, the fractional publication counts have also been modified by using the square root of fractions to increase neutrality across the various fields (Sivertsen, 2018). In Denmark, the points are fractionalised only according to the number of co-authors representing Danish universities (excluding foreign co-authors), and an extra weighting of 25% is given to publications with international co-authors. In addition, to minimise possible re-distributional effects across the main scientific areas, each main field has a fixed share of the distributed core funding, based on publications (Aagaard, 2018). In neither Denmark nor Norway has fractionalisation had negative effects on collaboration (Sivertsen & Schneider 2012, Aagaard et al. 2014).

Summary:

- There are some differences between Finland, Denmark, and Norway in how the publication channel classifications are used in the publication performance indicator of universities' funding models, especially when it comes to the weighting of publications according to different publication types and levels, and how the publications and funding are calculated.
- Unlike in Norway and Denmark, in Finland the tasks of (i) developing the classification of the publication channels, on one hand, and (ii) developing the use of the classification (incl. weights) in the funding model of universities, on the other, are divided between (i) JUFO and (ii) working groups of the Ministry of Education and Culture. Adjustments to the JUFO system, publication weights, and counting methods require coordination and dialogue between these two parties.

5.2. Research performing and funding organisations

The use of the national publication channel classifications such as JUFO has not been limited to the funding model the ministries use to allocate funding between universities. In the Nordic countries, the national publication channel classifications have provided universities with a metric and tool for various local evaluations, ranging from the internal assessment and funding of units to the evaluation and comparison of researchers for hiring, promotion, or funding. Some of these practices are more problematic than others, because aggregate metrics developed for the meta-institutional level have severe limitations if applied mechanistically at micro level (Moed, 2020). The use of publication channel ratings for individual level assessment has especially caused much concern and critical discussion within the national research communities (see Chapter 2.5). Many institutions around the world use the Journal Impact Factor as the basis for hiring, promotion, and funding decisions – a practice condemned by the DORA Declaration (McKiernan et al., 2019; Saenen et al., 2019). Inappropriate local use of channel ratings has been recognised and investigated as a major concern in the evaluation of the publication indicator in both Denmark and Norway, highlighting the need to develop appropriate local models and responsible uses of classifications (Sivertsen & Schneider 2012, Aagaard et al. 2014; for Poland and Australia, see Kulczycki, Rozkosz, et al., 2020; Woelert & McKenzie, 2018).

5.2.1. Local uses of JUFO levels

In Finland, the local use of the JUFO levels has been debated since the establishment of the classification. Sixty learned societies raised concerns about the possibly inappropriate local use of JUFO levels as early as 2012 (Toimituskunta, 2012), and some of the practices have been documented in surveys (Sivula et al. 2015). The use of JUFO levels in the Finnish universities was studied by the Federation of Finnish Learned Societies and Universities Finland in 2015. Although the findings of the survey conducted in 2015 are now outdated, the responses from 10 rectors, 19 deans, and 68 heads of department show the different uses of JUFO levels. According to

the survey results, JUFO levels were most frequently used to follow and develop the universities' publishing activities. In many universities, the rating is used for funding allocations to faculties and/or departments, and its use for evaluation purposes at the individual level is also attested. The JUFO levels were used most commonly in the Social Sciences and especially Humanities fields, where alternative citation-based metrics have been lacking. The findings were highly consonant with those from the other Nordic countries (Pölönen & Wahlfors, 2016; Wahlfors & Pölönen, 2018).

Universities are autonomous in choosing which methods, data, and indicators they use in the evaluation, development, and management of their activities. Even if content-based expert assessment of research is in principle the preferred method for the evaluation of research quality, this approach is costly in terms of the experts' time and effort, and it is also susceptible to the evaluator's subjective bias and area of expertise. It may therefore be legitimate in some evaluation procedures, especially those involving large numbers of researchers and publications, to support expert assessment with, or even rely entirely on, publication metrics. In many fields – especially the Natural Sciences and Medicine – publication and citation counts or JIFs derived from the international Web of Science or Scopus databases would be the preferred option (see Figure 2.1). An important reason for choosing to use the national publication indicator based on channel ratings is that it is relatively easy to apply locally for various evaluation purposes (Söderlind et al., 2019). Both the publication data, which the universities themselves provide to the Ministry, and the national publication channel lists are readily available. In addition, the national publication indicator and channel ratings may also present the same advantages for universities as they present for the Ministry of Education and Culture at the national level: an indicator based on community-curated, comprehensive, transparent, and comparable publication data and channel classification covering all fields.

In Denmark, Finland, and Norway, a more frequent use of the national publication indicator is reported in the Social Sciences and Humanities than in the Natural Sciences, Medicine, and Engineering, probably because other comprehensive metrics have been lacking (Sivertsen & Schneider 2012; Aagaard et al. 2014; Aagaard, 2015; Pölönen & Wahlfors, 2016; Wahlfors & Pölönen, 2018; Krog Lind, 2019). The

Finnish survey conducted in 2015 showed that the peer-assessment, number of publications, impact factors, citations, and other publication channel ratings in Natural Sciences and Engineering were used much more frequently than the JUFO levels. However, especially in the Humanities, assessment relied on peer review and the number of publications, and there was no indication of the use of quality metrics other than the JUFO levels. It was also more frequent in the humanities than other fields to use the rating for other purposes such as evaluating the qualifications of a docent, conference travel grants, or translation grants. In the Humanities and Engineering, the rating was also used to choose a publication channel for thesis articles. The rating was most frequently used for personal rewards or bonuses in Engineering, which may be due to the more formal incentive systems in place in the technical universities at the time (Pölönen & Wahlfors, 2016; Wahlfors & Pölönen, 2018).

An obvious motivation for using the national publication indicator locally is that the university's share of core funding from the Ministry partly depends on the performance measured by the same indicator. In Finland, the Ministry of Education and Culture has emphasised that the internal distribution of funds should be based on universities' own strategic priorities instead of on replicating the funding model criteria. Nevertheless, the incentive for universities to comply with those criteria is relatively large: currently, 14% of core funding is allocated annually on the basis of publications. Using the national publication indicator for the purpose of budget maximisation may be an especially important motive in those universities, subunits, and fields that depend more on core funding from the Ministry of Education and Culture than on external competitive funding.

Nevertheless, the incentives of the Ministry's funding model do not alone explain the local use of the national publication channel ratings. Publication channel lists are regarded as providing useful information that supports quality assessment in their own right. In Sweden, several universities use the Norwegian levels for internal evaluation purposes, even if this has no effect on the funding from the Swedish government, which is based on a Web of Science-based indicator (Hammarfelt et al., 2016; Hammerfelt, 2018). The Ministry of Social Affairs and Health has distributed funding for university-level health research conducted in the special responsibility (ERVA) are-

as of hospital districts (Finlex 1326/2010 §61). Previously, the Journal Impact Factor was used as the main quality measure, but since 2010, some of the research committees in charge of the funding decisions have included JUFO levels among the evaluation criteria. Interestingly, a study found that the JUFO levels take clinical research, small specialties, and domestic publications better into account than Journal Impact Factor as the basis of this funding (Tähtinen, Rautava & Happonen, 2014).

In many fields, it has long been a tradition that the experts who make hiring, promotion, and funding decisions consider – among other issues – if the candidate has published research reports in the leading venues (Jauch & Glueck 1975; Serenko & Dohan 2011, Haustein 2012; Rafols et al., 2012). In the Finnish research community, the journal or publisher was also considered relevant information regarding the research quality long before the establishment of JUFO classifications (Puuska & Miettinen, 2008). In universities from China to North America and Europe, the most frequently used metric to assist or even replace expert judgement has been the Journal Impact Factor (McKiernan et al., 2019; Saenen et al., 2019; Zhang & Sivertsen, 2020). Especially from the perspective of the Social Sciences and Humanities, the Journal Impact Factor suffers from the inadequate coverage of the Web of Science (see Figure 2.1). In Spain and Italy, evaluation agencies have established more comprehensive lists of journals and/or book publishers for the purpose of criteria-based assessment of individual researchers in the national academic promotion procedures (Gimenez-Toledo & Roman-Roman, 2009, Ferrara & Bonaccorsi, 2016).

Since 2010, the universities have been responsible for evaluating their education, research, and artistic activities under the Universities Act (Wang, Vuolanto, & Muhonen, 2014). In Finland, these research assessment exercises (RAE) are not coordinated or conducted nationally, but the universities decide the aims, methods, and data according to their specific needs. The RAE evaluations, which typically take place every few years, focus on organisational units or research communities, not individual researchers. It is also important to emphasise that the results of institutional RAEs have no effect on the core funding from the Ministry. The main focus is on institutional learning and improvement, even if in some cases, they may also inform internal funding distribution. Concerning the evaluation of research activities,

RAEs typically rely on Expert Panel assessment informed by bibliometrics. Evaluation panels are usually supplied with Web of Science or Scopus data. However, it has been increasingly common to complement bibliometric analyses with institutional publication data and JUFO levels (Wang, Vuolanto, & Muhonen, 2014; Hakala & Roihuvuo, 2015). In seven out of eight RAEs conducted since 2014, the universities have used the JUFO classification in their assessment (Table 5.5). National publication data and JUFO levels could be used to complement Web of Science and Scopus data to increase coverage of fields, publication types, and languages in other macro level analyses such as the State of Research in Finland reports or the publication indicator used by the Academy of Finland for assessment (Pölönen & Auranen, 2020).

Table 5.5. Most Finnish universities have used the JUFO classification in their research assessment exercises. Source: information from universities; information from the following universities were not found: University of Turku; University of Vaasa; University of Lapland; and Åbo Akademi. Also University of Turku is known to have used JUFO-levels in 2015 assessment.

University	Year	JUFO classification used?
Aalto University	2018	yes
Lappeenranta University of Technology	2019	yes
Tampere University of Technology	2017	no
University of Eastern Finland	2019	yes
University of Helsinki	2019	yes
University of Jyväskylä	2018	yes
University of Oulu	2014	yes
University of Tampere	2014	yes

In addition to providing indications of the leading journals and book publishers, the national publication channel lists may help evaluators and researchers identify properly peer-reviewed publication channels and avoid questionable channels such as predatory journals (Vilén & Savolainen, 2019). The university libraries use JUFO classifications as one of the resources to help students and researchers assess the reliability and/or importance of journals and book publishers. For example, an increasing number of academic theses and studies use JUFO classifications as an information

source to delineate a group of publications for publication-based analyses (Figure 5.1). In addition, JUFO levels support the evaluation of publication channels for library collection management.

5.2.2. Guidelines and recommendations for responsible local use

Studies have shown that individual universities, faculties, and departments in each Nordic country may differ considerably in how they use – or choose not to – the national publication indicator or channel ratings (Aagaard, 2015; Krog Lind, 2019). Nevertheless, the Finnish survey showed that the needs and expectations of universities and evaluators concerning the JUFO levels were multifaceted. Yet a publication channel classification, the framework of which is dictated by its use in the national-level funding model, may be unable to fully meet all these needs. The national ratings of publication channels produced in the Nordic countries aim for a balanced representation of all scientific fields and represent a compromise of disciplinary standards that does not fully correspond to an ideal classification from the perspective of each field, let alone researcher (Sivertsen, 2018; Pölönen et al., 2020a). The broad level categories (0, 1, 2, and 3) do not always reflect the perceived hierarchy of publication channels sufficiently accurately within or between specific fields, and some important channels are left outside the higher JUFO levels 2 and 3 due to quota restrictions (see Chapter 4.3). While the national publication channel classification can provide an adequate measurement of the average quality of universities' entire publication output (see Chapter 4.4), a more accurate assessment of outputs is typically needed in evaluations at the individual level. This is because an article or book can represent a higher or lower level of quality, impact, or significance than the publications in a journal or book publisher generally do.

The Leiden Manifesto for research metrics (Hicks et al., 2015) and the Metric Tide report (Wilsdon et al., 2015) recommend that the evaluation of the quality of research at universities, other research organisation units, or individual researchers must primarily be based on expert evaluation, but research metrics can be used to support the evaluation. The JUFO Steering Group has addressed the concerns about inappropriate local use since 2012 by publishing user guidelines for the responsible

use of the JUFO classification. The JUFO Steering Group has periodically updated the user guidelines, explaining the limitations the JUFO levels have when applied to a smaller number of publications at unit or researcher level (JUFO, 2020). Accordingly, the Steering Group's user guidelines states that a responsible use of the JUFO levels to support evaluations needs to consider the following:

- limitations concerning the use of the Publication Forum classification system (as detailed in the guideline document);
- the use of other publication channel- and/or publication-specific research metrics as diversely as possible, considering the differences and characteristics of various scientific fields;
- the use of the expertise of libraries and/or other bibliometric experts in the creation and interpretation of research metrics based on the JUFO classification;
- transparently explaining to the personnel in which contexts and how the JUFO classification is used;
- hearing researchers' views about the applicability of the JUFO levels for various evaluation purposes in their own scientific or research field.

In addition, JUFO has actively participated in the development, led by the Federation of Finnish Learned Societies, of the National Recommendation for the Responsible assessment of researchers in Finland, published in 2020 (TJNK & TSV, 2020). Concerning the evaluation of the scientific quality of research, the recommendation states that "Evaluation of scientific quality is primarily carried out by examining the scientific output of the research. Research metrics may also be used to support the overall evaluation when relevant to the researcher's field of study." Recently, the Academy of Finland – the main basic research funding agency in Finland – and Universities Finland UNIFI have committed to the recommendation for the responsible evaluation of Finnish researchers (Academy of Finland, 2020; Universities Finland, 2020). In addition, they are signatories of the DORA Declaration. While the Academy of Finland has explicitly forbidden applicants to report JUFO levels or Journal Impact Factors in their publication lists (aka.fi 2020), the extent to which the various other

institutions and funders in Finland use JUFO levels in the assessment of researchers is much less clear. To promote a responsible assessment culture, including the responsible use of JUFO levels, it is important that all research performing and funding organisations commit to the National Recommendations for Good Practice in Researcher Evaluation (2020), and follow the User Guide for the Publication Forum Classification (2020).
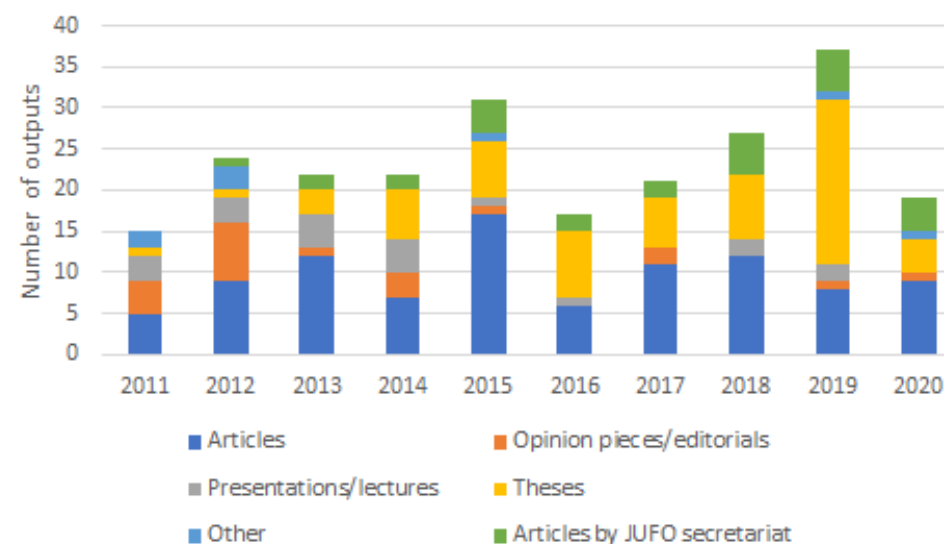
Figure 5.1. An increasing number of theses and studies use JUFO levels as a source of information or basis of evaluation. In all, 241 records of relevant publications from 2011 to June 2020 mentioning "Julkaisufoorumi" or "Publication Forum" were retrieved from Google Scholar.

Summary:

- Finnish universities use the JUFO levels to monitor and develop their publishing activities, fund allocation between faculties and/or departments,

and in some instances, for evaluation purposes at the individual level. As in Denmark and Norway, the national publication channel classification is used as an assessment tool more often in the Social Sciences and especially the Humanities than the other fields.

- In most institutional research assessment exercises, JUFO levels have complemented Web of Science- or Scopus-based citation analyses as background information supporting assessments of international expert panels. The national publication data and JUFO levels could also be used to increase the coverage of fields, publication types, and languages in other macro-level analyses (e.g. the "State of Research in Finland" analyses of the Academy of Finland).
- The needs and expectations of universities and the researchers concerning the JUFO ratings are more multifaceted than were originally planned or meant (by the Ministry of Education and Culture or the UNIFI working-group). As its primary use purpose is to serve the Ministry's funding model, the JUFO classification will not be able to adequately serve all other purposes which universities and researchers may be using it. At any rate, the limitations of JUFO levels as a quality indicator of individual publications or researchers need to be seriously considered in all uses of JUFO levels in evaluations by research performing and funding organisations.
- The Academy of Finland and Universities Finland UNIFI have committed to the "Recommendation for the responsible evaluation of a researcher in Finland", and are also signatories of the DORA Declaration. The Academy of Finland has explicitly forbidden applicants of research funding to report JUFO levels or Journal Impact Factors in their publication lists.
- The limitations of JUFO levels as a quality indicator need to be considered in all uses of JUFO levels in evaluations by organisations performing and funding research. To promote a responsible assessment culture, including the responsible use of JUFO levels, research performing and funding organisations need to commit to the National Recommendations for "Good Practice in Researcher Evaluation" and follow the "User Guide for the Publication Forum Classification".

6. Development of publishing in Finland 2011–2017

Summary:

Question 5. What kind of changes in publishing patterns in Finland have coincided with the introduction and adjustments of JUFO classifications?

Key take-aways:

- In 2011-2017, peer-reviewed outputs are increasingly published in higher JUFO levels, especially in the level 2 and 3 publication channels. Simultaneously, there is a substantial decline in publications on the JUFO level 0.
- The increasing number of publications in scientific publication channels of higher JUFO levels has not taken place at the expense of the amount of publications addressed to professional and general audiences.
- Publishing in international peer-reviewed journals in English has increased over 2011-2017. However, publishing in book chapters and conferences, as well as publications in the national languages (Finnish and Swedish), have remained relatively stable at JUFO levels 1–3, even in the fields of Social Sciences and Humanities. Only the number of monographs published has declined, including at JUFO level 1.
- Publishing in DOAJ indexed gold open access (OA) journals as well as green OA journals (that allow self-archiving), has been increasing over2011-2017on JUFO levels 1–3. However, publishing in predatory journals remains, on the contrary, a very marginal practice.
- The number of peer-reviewed outputs with international and domestic inter-university collaboration and co-authorship is increasing at JUFO levels 1–3. Even in the Humanities, where single authorship remains common, co-authors are increasingly from other Finnish or international organisa-

tions than from the same institution.

- There are no signs of a decline in multidisciplinarity; rather, multidisciplinary publications have somewhat increased over 2011-2017.

In this section, the development of the Finnish universities' publication practices is investigated based on data derived from the VIRTA Publication Information Service. VIRTA integrates bibliographic data from the 14 Finnish universities' institutional current research information systems (CRIS). When the dataset was downloaded in June 2019, the VIRTA data comprehensively covered outputs published in 2011–2017, so this data range is also used in this report. In VIRTA, the co-publications of Finnish universities appear as duplicates. For each publication, the reporting university has indicated the publication type and audience, peer review status, open access information, and OECD field of science. For peer-reviewed outputs, VIRTA automatically identifies the publication channel and JUFO level as registered in the Publication Forum database.

The development of publishing between 2011 and 2017 is analysed both at the level of main fields and universities to identify the changes that have happened across all fields and universities, as well as developments that are more field- or university-specific. The main purpose of the analyses presented in this chapter is to identify changes that should be addressed in the further development of the Publication Forum classification. It is not the purpose of this report to evaluate or rank fields or universities with regard to any aspects of their publication activities, and the results presented in this section should not be interpreted in this way.

Note on effects and productivity
Comprehensive analyses covering periods both before and after the Publication Forum are impossible. It is also not the purpose of this self-evaluation to investigate or establish the effects of PRFS or the Publication Forum on publishing practices. It is important to remember in interpreting the results presented in this chapter that it would first be difficult to separate the effects of the Publication Forum or the funding model publication indicator from those of the various international, national, and institutional evaluation and funding systems that create publishing incentives for
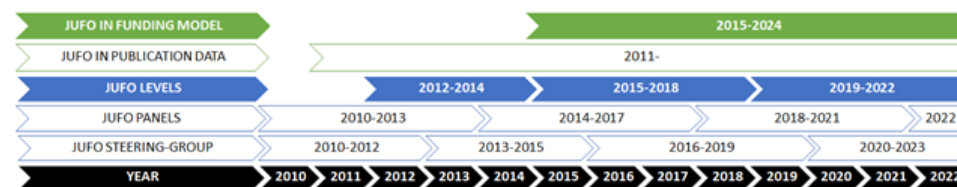
Figure 6.1. Timeline for the Publication Forum Steering Groups and panels, establishment of the JUFO levels and their updates, identification of JUFO levels in publication data, and the introduction of the JUFO levels to the funding model.

researchers. Second, it would be difficult to attribute causality, because it is unclear when exactly JUFO levels, and which JUFO levels, took effect: JUFO was established in 2010; the first JUFO levels were published in 2012; JUFO levels 2 and 3 were updated in 2015 and 2019; JUFO levels were included in the publication indicator in 2015 (applied to outputs published in 2011–2013) (Figure 6.1.).

It is also important to note that this report considers development at the level of outputs without relating the number of publications to the number of researchers or resources. In other words, we are not investigating the productivity of Finnish researchers or universities in terms of quantity or quality. Pölönen & Auranen (2017) analysed national personnel and publication data on Finnish universities, finding that the average number of peer-reviewed publications per researcher among Finnish university staff had not increased between 1998 and 2016 (however, see Poropudas, 2018). This result is consonant with international analyses based on Scopus and Web of Science (Fanelli et al., 2016). Reports on the impact of the Universities Act reform in 2010 (Ministry of Education and Culture, 2016) on the incentives created by the funding model (Seuri & Vartiainen, 2018) suggest that productivity has increased in terms of quality.

Issues to be considered in interpretation of the results:

- Data consistency: Universities take responsibility for the publication information they report to the Ministry of Education and Culture in accordance with the ministry's data collection guidelines. There can be inconsistencies in

the data, because the registering of publication information at universities involves both researchers' self-reporting and validation by the data collection personnel from the university libraries. Some of the Finnish universities have established their CRIS systems at different times, and their systems may use different data models, from which publication information is adapted to the requirements of the Ministry of Education and Culture data collection. The Ministry of Education and Culture's data collection has also developed considerably, as VIRTA replaced a less developed reporting system only in 2016.

- Changes in definitions: The Ministry of Education and Culture outlines the definitions and information requirements for all data reported by universities. Some important changes have occurred since the beginning of publication data collection in 2011. Before 2015, peer-reviewed articles in books could be admitted without an ISBN, and conference articles without an ISSN and ISBN. In the case of monographs and edited works, peer review was not a specific requirement. The reporting of edited works also changed in 2015: previously, it was not the edited work that was reported but the introductory piece of writing, of which the editors were the authors. The reporting of open access information changed in 2016.

- National and Institutional incentives: The share of core funding based on publications increased in 2013 from 1.7% to 13%, which may have increased institutions' publication reporting activity. Notably, this may concern non-peer-reviewed publications for professional and general audiences that were included with a small weighting in the publication indicator in 2015. Some universities may also have carried out institutional research assessment exercises, or they may have introduced internal evaluation or funding systems, based entirely or partly on the CRIS data. Such changes may have increased the propensity of researchers to report publication outputs to institutional CRIS systems.

- Specific to this report: In this report, we exclude from the publication counts Studia Biographica, which publishes more than a hundred short biographical articles in Finnish in some years, and no articles at all in others (see also Puuska, 2014). JUFO levels 2 and 3 were updated in 2015 and applied to peer-reviewed publications published in 2015 or later. In this update, a

large number of journals across all fields but especially Science, Technology, Engineering, and Mathematics were downgraded. As a result, the share of peer-reviewed publications in JUFO levels 3 and 2 is larger, and that in JUFO level 1 is larger, from 2015 than before 2015. To provide a consistent picture of the publishing development with regard to JUFO levels, we have also applied the 2015 JUFO levels retrospectively to outputs published in 2011–2014. We report only results for units that include at least 50 publications.

6.1. Number of publications

In this section, the overall development of Finnish universities' publishing is analysed in terms of all the publication outputs.

The total amount of universities' output increased during the period by 8% if we compare two-year averages in 2011–2012 and 2016–2017 (Figure 6.2.). There are some field-specific differences. The increase in output is strongest in Medicine (a 22% increase in 2017 compared with 2011), and Natural Sciences, Social Sciences and the Humanities have also increased their output (11%, 9%, and 5% respectively). The outputs in Agriculture were 17% lower in 2017 than in 2011, and the output in Engineering decreased by 10%.

While most universities show more or less similar development, there are some differences (Figure 6.3.).

The most significant increase (195%) is attested in UniArts, which has the smallest overall output. Of the larger universities, Turku (23%) and Tampere (17%) have increased their output most. Some universities' output has decreased, notably in Vaasa (-22%) and Tampere University of Technology (TUT) (-4%).

Summary:

- Total publication output by Finnish universities increased towards the end of the analysis period (2017).
- The observed increase could be, however, partly due to universities' increased effort to perfectly register all their publication outputs (e.g., University of Helsinki and University of Turku) for institutional research assessments (rather than only increase in publication output per se).
- The differences in observed trends of total publication output between scientific fields and universities can be partly due different performance management systems at different universities (and the different weights assigned to scientific publication outputs, vs. other indicators of education and research performance).
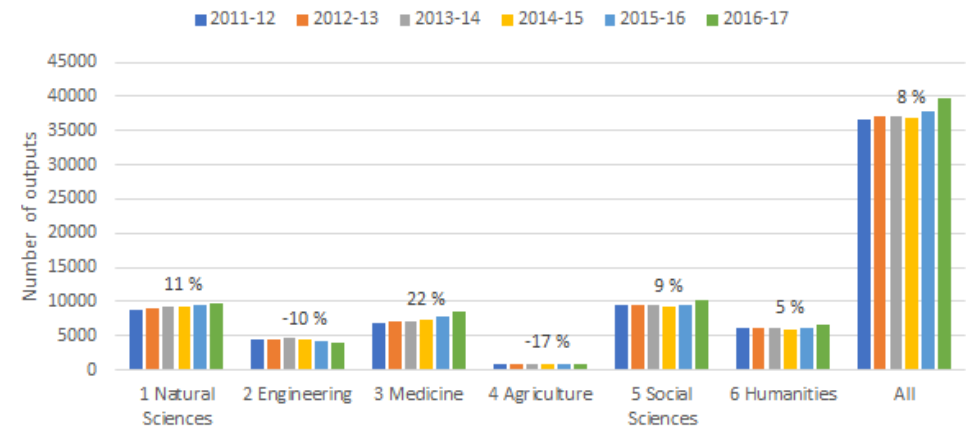
Figure 6.2. Universities' total publication output has increased by 8% between 2011-2017, with largest increases in Medicine, Natural sciences, and the Social Sciences. The percentage indicates the change from 2011–2012 to 2016–2017. Total number of outputs: 263,668. Source: VIRTA Publication Information Service.
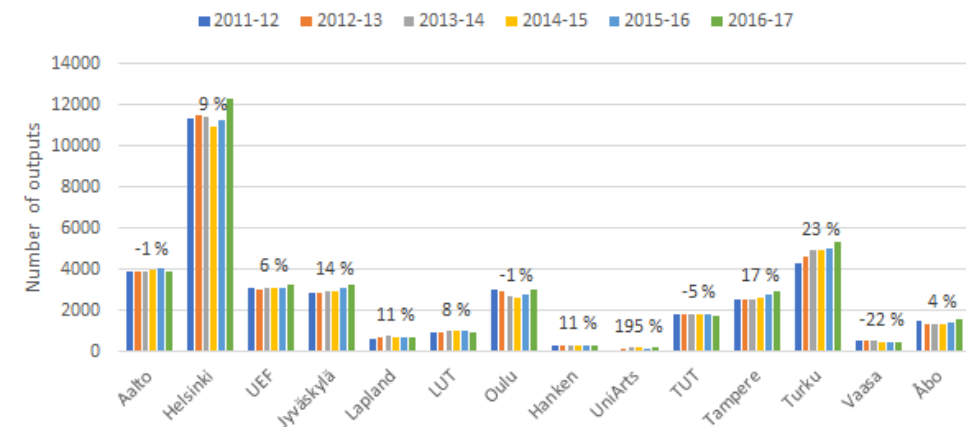
Figure 6.3. The total publication output increased in almost all Finnish universities between 2011 and 2017. The percentage indicates the change from 2011–2012 to 2016–2017. Total number of outputs: 263,668. Source: VIRTA Publication Information Service.

6.2. Scientific, professional, and general publications

In this section, the development of the Finnish universities' peer-reviewed and non-peer-reviewed publishing is analysed in terms of the JUFO levels and publications addressed at scientific, professional, and general audiences.

The number of peer-reviewed scientific publications increased by 14% during the period, while the number of non-peer-reviewed outputs for scientific audiences (typically notes, letters, book reviews, opinion pieces etc.) decreased by 26% (Figure 6.4.). The number of publications for professional audiences – after a small decline – was 21% larger in 2016–2017 than in 2011–2012, and the number of outputs for general audiences remained stable over the period.

Important changes occurred within the peer-reviewed component of the universities' output (Figure 6.5.). The number of level 0 outputs decreased by 55% (from 4,793 in 2011–2012 to 2,161 in 2016–2017). Meanwhile, the number of peer-reviewed outputs at higher-level channels was considerably larger in 2016–2017 than it was in 2011–2012 (a 25% increase in level 1, 40% in level 2, and 48% in level 3). This finding is consonant with earlier analyses of publishing according to JUFO levels (Ministry of Education and Culture, 2016; Seuri & Vartiainen, 2018).

The number of peer-reviewed outputs at level 0 decreased in all fields (Appendix 1, Figure 1), and most fields increased the number of outputs at level 1, with the exception of Agriculture (where there was an overall decline in the number of peer-reviewed outputs). In most fields, the number of level 2 outputs increased more compared to level 1 except in Medicine. In Natural Sciences, Engineering, and Agriculture, the number of level 3 outputs increased less, and in Medicine, Social Sciences and Humanities more than the number of level 2 outputs.

All universities decreased the number of level 0 peer-reviewed outputs considerably between 2011–2012 and 2016–2017 (Appendix 1, Figure 2). Almost all universities have increased the number of level 1, 2, and 3 outputs. In most universities, the
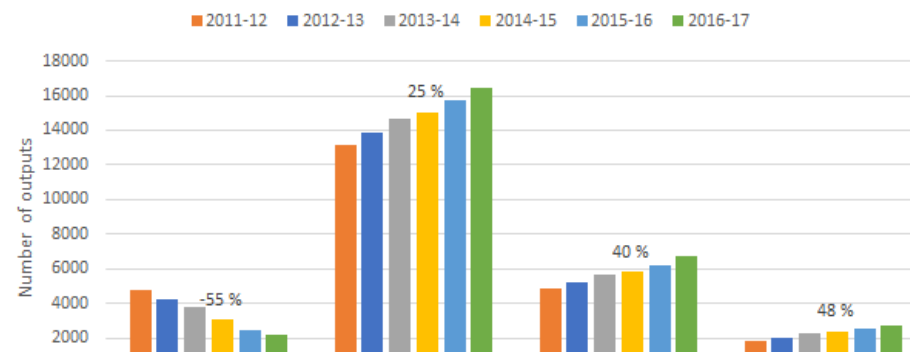
Figure 6.4. The number of peer-reviewed scientific publications increased by 14% from 2011 to 2017, while the number of professional publications increased by 21% and the number of publications for general audiences remained constant. The percentage indicates the change between 2011–2012 and 2016–2017. Total number of outputs: 263,668. Source: VIRTA Publication Information Service.
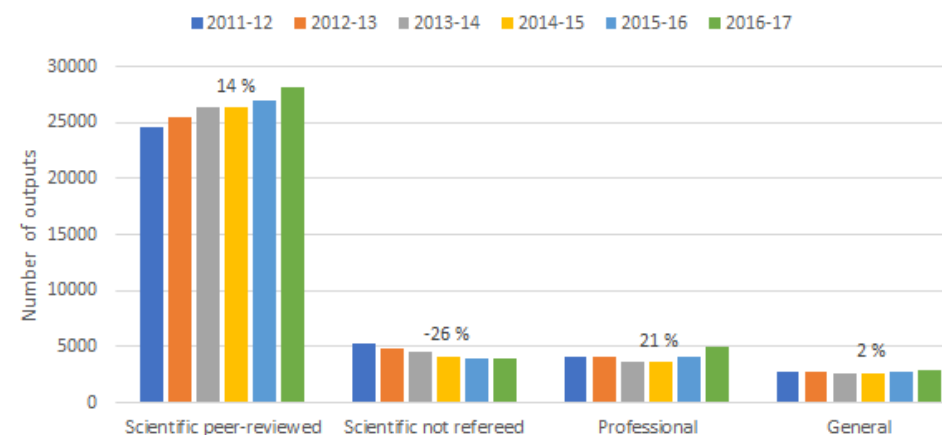
Figure 6.5. The number of level 0 publication outputs decreased by 55% from 2011 to 2017, while the number of level 1-3 outputs increased significantly (25-48%). The percentage indicates the change between 2011–2012 and 2016–2017. Total number of outputs: 184,105. Source: VIRTA Publication Information Service.

number of level 2 outputs increased more than level 1 outputs, and in some universities, even more than the number of level 3 outputs. The strongest increases in level 2 and 3 outputs took place in Vaasa, Tampere University of Technology (TUT), and Lappeenranta-Lahti University of Technology (LUT), and at level 2 especially in Lapland and UniArts.

There are considerable differences between fields in the development of the number of non-refereed outputs (Appendix 1, Figure 3). The number of non-peer-reviewed outputs in academic/scholarly channels has decreased in all fields, but most in Engineering (-76%), Natural Sciences (-50%) and Agriculture (-43%). The number of professional outputs has decreased mainly in Engineering (-29%), while Medicine (52%), Social Sciences (25%), and Humanities (29%) have increased the number of professional outputs. The number of outputs for general audiences has decreased considerably in Engineering (-57%) and Agriculture (-38%), increased in Medicine (30%) and Social Sciences (22%), and remained stable in Natural Sciences and Humanities.

All the universities have decreased the number of non-refereed outputs for scientific audiences. However, the decrease is strongest in LUT, TUT, and Aalto, as well as Vaasa (Appendix 1, Figure 4). Most universities have increased the number of outputs for professional audiences (notably Hanken – though the number is very small – and Turku), while only in LUT and Oulu has their number decreased significantly. The number of outputs for general audiences has increased most in Jyväskylä and the University of Eastern Finland (UEF), and decreased most in Vaasa and Oulu.

Summary:

- Over 2011-2017, peer-reviewed outputs were increasingly published on ohigher JUFO levels, especially level 2 and 3 channels
- The shift towards higher JUFO level channels over 2011-2017 was stronger in the Social Sciences and Humanities, as well as Engineering, than in Medicine and Natural Sciences. This may be partly due to the greater amount of publishing on the higher levels in Medicine and Natural Sciences already at the beginning of the analysis period. In Agriculture, Helsinki was almost the only active university.
- The increasing number of publications in scientific publication channels of higher JUFO levels has not taken place at the expense of the amount of publications addressed to professional and general audiences.

6.3. Bibliodiversity of peer-reviewed publications

In this section, the development of bibliodiversity in Finnish universities' peer-reviewed publishing is analysed in terms of the use of journals, conferences, and books as outlets. There have been concerns about the decline of book publishing in the Social Sciences and Humanities. Although journal publishing is increasing in many European countries, book publishing remains important (Kulczycki, 2018; Engels et al., 2018).

The diversity of peer-reviewed publication types decreased somewhat during the period in the sense that the number of journal articles increased by 30% between 2011–2012 and 2016–2017, while that of book publications (including articles in books, edited works, and monographs) and conference articles decreased by 5% and 22% respectively (Figure 6.6.). However, the decrease in book and conference outputs occurred mainly at level 0. The number of book publications at level 1 remained stable, and increased at levels 2 and 3. For different kinds of book publication the numbers developed similarly, with the exception of monographs, the number of which also declined by 46% at level 1 (Figure 6.7.). The number of conference articles is decreasing quickly at level 0 but increasing at level 1 or 2 (there are only a few level 3 outputs). The number of journal articles increased during the period at all levels, remaining constant even at level 0.

Leaving aside the peer-reviewed outputs in level 0 channels, it can be observed that the number of all publication types increased in all fields where there were enough outputs of the given publication types in the level 1–3 channels (Appendix 1, Figure 5). The increase in journal articles was strongest in the Social Sciences and Humani-

ties. However, the number of book publications also increased. All universities have increased all publication types in the level 1–3 channels, with the exception of a small decrease in the number of conference articles at Åbo (Appendix 1, Figure 6).

Summary:

- Even if publishing in peer-reviewed journals increased over 2011-2017, conference and book publishing only declined at JUFO level 0.
- In the Social Sciences and Humanities, the threat of a decline of book publishing did not materialise. Instead, book publishing shifted to higher JUFO levels.
- In Engineering and Natural Sciences (most notably in Computer Science), conference publishing also increased at JUFO levels 1 and 2.
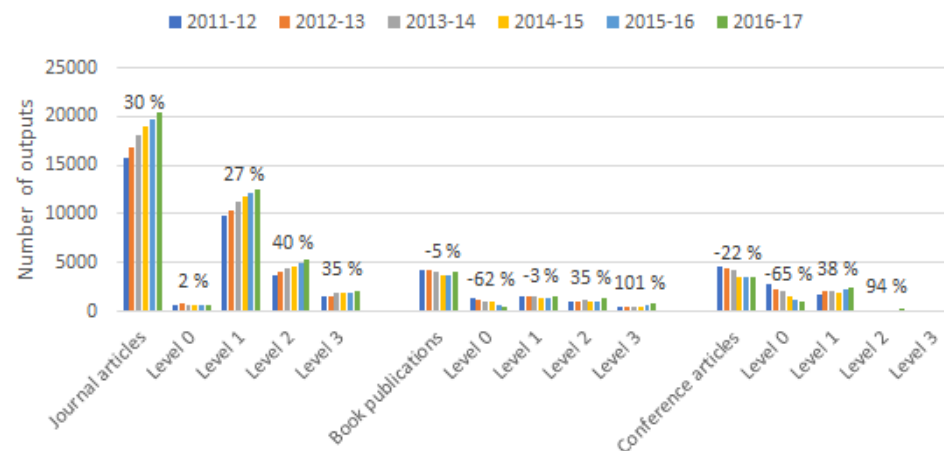
Figure 6.6. The decrease in book and conference publication outputs from 2011 to 2017 only occurred with books and conferences at JUFO level 0. The percentage indicates the change between 2011–2012 and 2016–2017. Total number of outputs: 184,105. Source: VIRTA Publication Information Service.
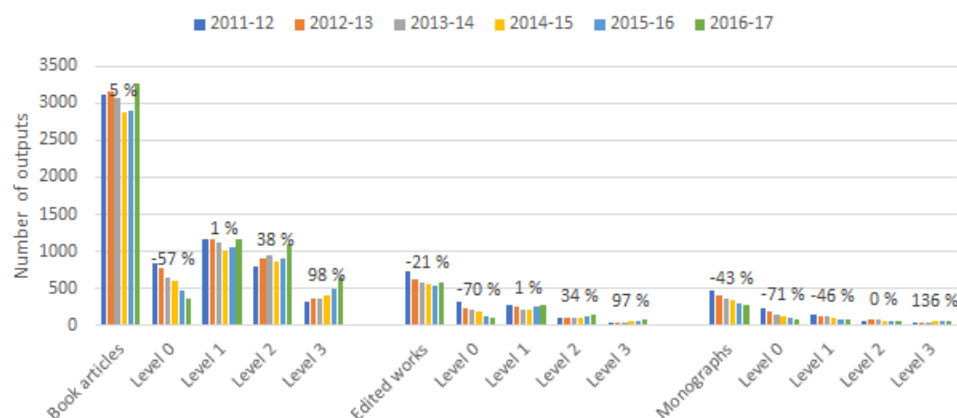
Figure 6.7. Different kinds of book publications developed similarly from 2011 to 2017, with decrease in publications at JUFO level 0 and increase in publications especially at levels 2 and 3. The percentage indicates the change between 2011–2012 and 2016–2017. Total number of outputs: 28,463. Source: VIRTA Publication Information Service.

6.4. Domestic and foreign publishing

In this section, the development of Finnish universities' peer-reviewed outputs published in Finland and abroad is analysed. The growth of publishing with foreign publishers, and the corresponding decline of the share of articles and books published in Finland, can be traced at least back to the mid-1990s (Auranen & Pölönen, 2014; Pölönen et al., 2018; Matthies et al., 2020).

Peer-reviewed publishing has become more international in the sense that the number of peer-reviewed outputs published in Finnish channels (country of publication Finland) was 14% smaller in 2016–2017 than in 2011–2012 (Figure 6.8.). During the same period, the number of outputs published abroad increased by 19%. Nevertheless, the number of outputs published in Finland decreased only in level 0 channels, while it remained fairly stable at levels 1–3 (there are very few level 3 outputs). The number of level 0 outputs published in foreign channels also decreased, while the number of outputs increased at level 1, and most strongly at levels 2 and 3.

The change in the number of peer-reviewed outputs in the level 1–3 channels published in Finland differed between fields (Appendix 1, Figure 7). The strongest increase occurred in Engineering (26%), Humanities (13%), and Medicine (7%), while there was little or no change in Natural Sciences and Social Sciences. There were only small changes in Agriculture in both domestic (-4%) and foreign (2%) outputs. In other fields, there was a strong increase in foreign outputs, especially in Social Sciences (63%) and Humanities (47%). The number of domestic outputs decreased only at Aalto and Helsinki, while that of outputs in foreign channels increased at all universities (Appendix 1, Figure 8).

Summary:

- Over 2011-2017, the number of peer-reviewed outputs published with Finnish publishers decreased on JUFO level 0 but remained stable on JUFO levels 1-3.
- Publishing with foreign publishers increased mostly in the fields of Social Sciences and Humanities. However, publishing with domestic publishers also remained strong.
- The decline of outputs published in Finland at JUFO levels 1–3 may be partly due to intensive institutional internationalisation strategies in some universities.
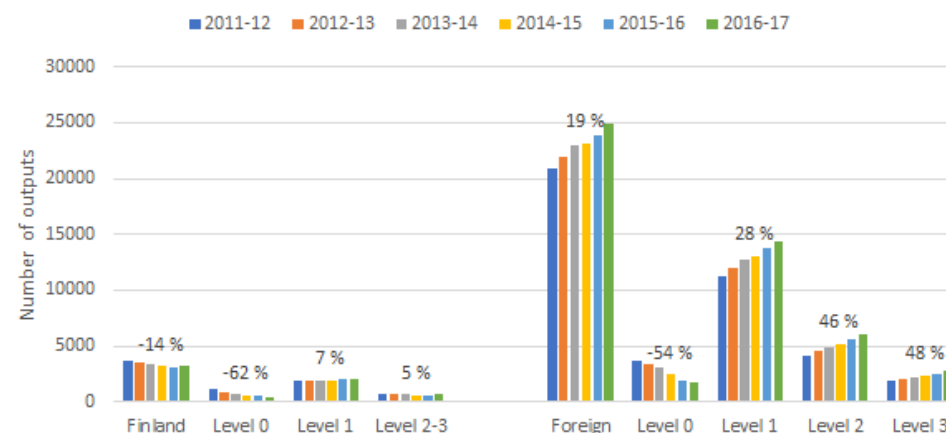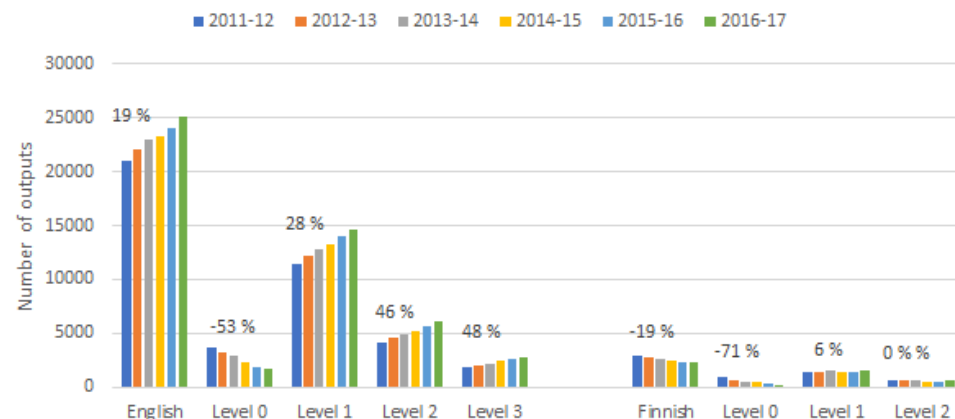
Figure 6.8. The peer-reviewed publication outputs in Finnish channels decreased Over 2011-2017, the only in level 0 channels, while it increased at levels 1-3. The percentage indicates the change between 2011–2012 and 2016-–2017. Total number of outputs: 184,105. Source: VIRTA Publication Information Service.

6.5. Multilingualism in scholarly communication

In this section, the development of the language diversity of Finnish universities' peer-reviewed outputs is analysed. Studies comparing several European countries show that national language publishing is a common pattern in the Social Sciences and Humanities, and that the increase in English-language publishing is an international trend (Kulckzycki et al., 2018; Kulczycki et al., 2020).

The diversity of publication languages decreased somewhat during the period in the sense that the number of peer-reviewed outputs in English increased by 19%, while the number of outputs in Finnish (-19%), Swedish (-10%), and other languages (-15%) decreased (Figures 6.9. and 6.10.). A decrease occurred in all languages, including even English, in level 0 channels. Only the number of Swedish-language outputs also decreased at level 1. The number of peer-reviewed outputs in Finnish increased by 6% at level 1 and remained stable at level 2. The number of outputs in Swedish and other languages was very small.

By focusing only on level 1–3 peer-reviewed outputs, it is possible to observe that the number of English-language outputs increased in all fields except Agriculture (for other languages, the number of outputs was very small in Agriculture) (Appendix 1, Figure 9). The increase in English was strongest in the fields of Social Sciences and Humanities. However, the number of Finnish-language outputs also increased slightly or remained constant, except in Natural Sciences (-22%). For Swedish and other languages, the number of outputs was very small in the fields of Science, Technology, Engineering, and Mathematics. The number of Swedish-language outputs decreased in the Social Sciences but increased in the Humanities. The number of other languages remained fairly stable in the fields of Social Sciences and Humanities.

The number of peer-reviewed English-language outputs in the level 1–3 channels increased at all universities. However, the development of Finnish-language outputs showed some differences (Appendix 1, Figure 10). The number of Finnish-language outputs showed the strongest increase at Abo and UniArts, where the numbers were relatively small (they were also very small at Lappeenranta-Lahti University of Technology (LUT) and Hanken). But there was also some at the University of Eastern Finland (UEF), Jyväskylä, Oulu, Tampere, and Turku, while the number of Finnish outputs decreased by 43% at Aalto, and to a lesser extent at Helsinki, Tampere University of Technology (TUT), and Vaasa.

In addition to English and Finnish, Helsinki publishes more than 50 peer-reviewed Swedish and other language outputs annually: the number of Swedish outputs has declined by 10%, and other languages have increased by 6%. The only other university to exceed 50 peer-reviewed outputs per year in Swedish was Åbo, and their number declined by 6% between 2011–2012 and 2016–2017.

Summary:

- Even if English-language publishing increased over 2011-2017, the national languages remained stable in JUFO levels 1–3, because the decrease occurred only at JUFO level 0.
- At JUFO levels 1–3, the number of Finnish-language publications decreased in Natural Sciences and that of Swedish-language publications in Social Sciences.
- The decline of national-language publications at JUFO levels 1–3 may be due to intensive institutional internationalisation strategies in some universities.

Figure 6.9. The Finnish-language peer-reviewed publication outputs decreased from 2011 to 2017 only on JUFO level 0. The percentage indicates the change between 2011–2012 and 2016–2017. Total number of outputs: 179,680. Source: VIRTA Publication Information Service.
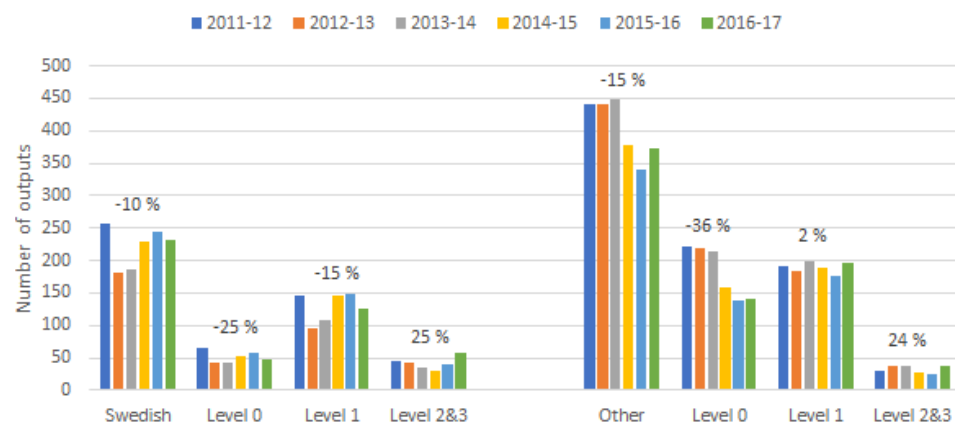
Figure 6.10. The Swedish-language peer-reviewed publication outputs decreased from 2011 to 2017 only on JUFO levels 0 and 1; other-language (than Finnish, Swedish, English) outputs only decreased on JUFO level 0. The percentage indicates the change between 2011–2012 and 2016–2017. Total number of outputs: 4,425. Source: VIRTA Publication Information Service.

6.6. Open access

In this section, the development of the open access of Finnish universities' peer-reviewed outputs is analysed. Recent analysis of the national publication data from VIRTA has shown that the share of open access articles in journals and conferences is more or less the same in JUFO levels 1, 2, and 3 (Ilva, 2020). However, it is known that in the case of book publications, the share of OA is considerably smaller (Pölönen et al., 2020b).

Open access has increased considerably during the period: the number of peer-reviewed outputs indicated in VIRTA as open access – including gold, hybrid, and green OA - was 144% larger in 2016–2017 than 2011–2012 (Figure 6.11.). It is important to note that the reliability of VIRTA data for open access of outputs has improved since 2016 (Ilva, 2017), which may partly explain the strong increase between 2014–2015 and 2015–2016. The number of OA outputs increased most in the JUFO level 2 and 3 channels, but also at JUFO level 1.

Other information sources for identifying OA publications also point in the same direction. The number of outputs in DOAJ indexed journals increased by 98%, and the increase occurred at all levels. Publishing in Green journals, allowing self-archiving according to the Sherpa/Romeo service, also increased by 40%, notably at levels 1–3. Publishing in predatory journals (as identified based on Cabell's blacklist and the DOAJ list of removed journals) is a relevant concern. However, predatory publishing remains a very marginal practice from the Finnish research perspective: only around 150 articles are annually published in predatory journals.

The number of open access outputs increased strongly in all fields, though somewhat less in Agriculture than other fields (Appendix 1, Figure 11). Publishing in DOAJ indexed and Green journals increased in all fields, and most strongly in the fields of Social Sciences and Humanities. This is perhaps explained by the strong increase in these fields in journal publishing in general. The number of open access outputs increased strongly in all universities, though to a somewhat lesser extent at Vaasa and the University of Eastern Finland (UEF) (Appendix 1, Figure 12).

Summary:

- Over 2011-2017, open access to peer-reviewed publications increased at JUFO levels 1–3, and remained stable at JUFO level 0.
- Open access also increased across all fields and universities.
- Publishing in higher JUFO level channels and open access increased at the same time.
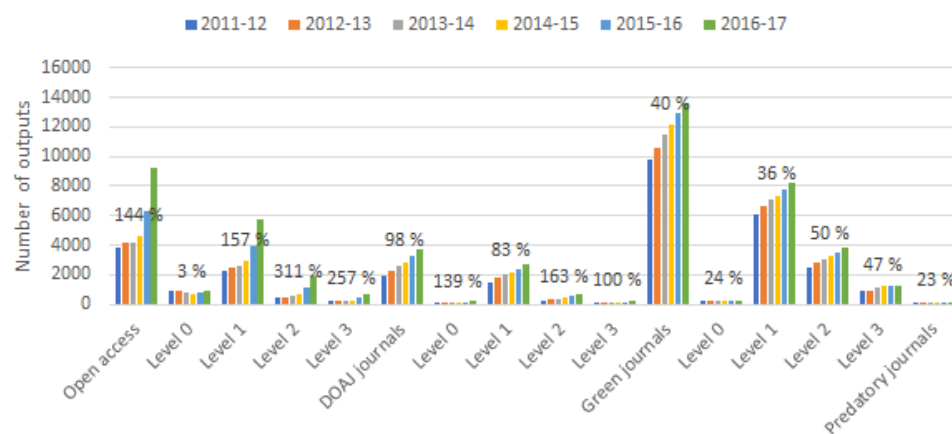
Figure 6.11. The number of peer-reviewed outputs indicated as open access increased from 2011 to 2017 at all JUFO levels. The percentage indicates the change between 2011–2012 and 2016–2017. Total number of outputs: 184,105. Source: VIRTA Publication Information Service.

6.7. Collaboration

In this section, the development of collaboration in Finnish universities' peer-reviewed outputs is analysed.

Collaboration in publishing increased in the sense that a growing number of peer-reviewed outputs had more than one author (a 21% increase), involved authors from more than one Finnish university (31%), and had co-authors affiliated with foreign institutions (44%) (Figure 6.12). The number of collaborative outputs increased at JUFO levels 1–3, while there was a decrease in all three types of collaboration at JUFO level 0.

The number of outputs with all three types of collaboration increased in almost all fields (Appendix 1, Figure 13). Only in Agriculture was there a slight decrease in inter-university collaboration. The strongest increase occurred in the number of international co-publications. However, in the fields of Social Sciences and Humanities, the increase in inter-university collaboration was also strong. The Humanities differ from other fields, because traditional single authorship remained important, and the number of co-authored outputs increased by only 7% between 2011–2012 and 2016–2017. However, the strong increase in inter-university and international collaborations meant that co-authors were increasingly found from other Finnish universities or foreign institutions.

Furthermore, almost all universities increased all types of collaborative output (Appendix 1, Figure 14). The sole exception was that output involving inter-university collaboration slightly decreased at the University of Eastern Finland (UEF). There were a couple of possible data issues: at Lappeenranta-Lahti University of Technology (LUT), the number inter-university collaborations declined from 160 in 2015 to 14 in 2016, and at Turku the number of international co-publications declined from 1,286 in 2015 to 99 in 2016.

Summary:

- Over 2011-2017, the number of peer-reviewed publication outputs with collaboration increased at JUFO levels 1–3, while it decreased at JUFO level 0.
- The number of peer-reviewed outputs with international and domestic inter-university collaboration and co-authorship is increasing at JUFO levels 1–3.
- Even in the Humanities, where single authorship remains common, co-authors are increasingly from other Finnish or international organisations rather than from the same institution.
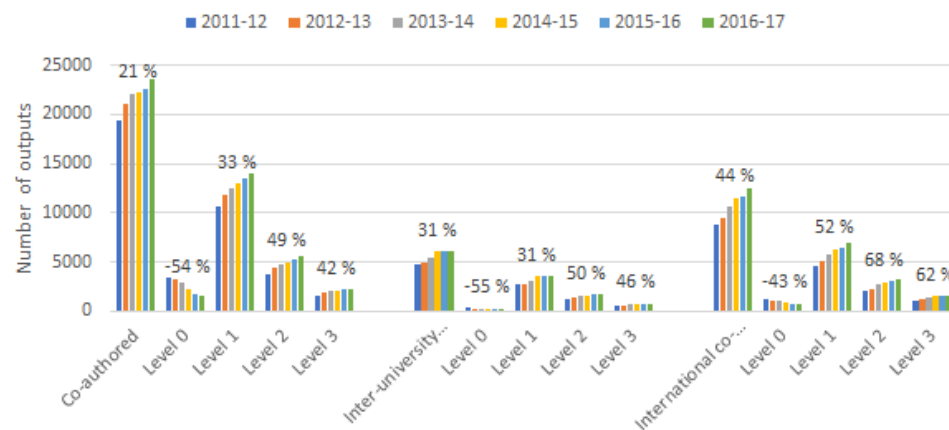
Figure 6.12. On JUFO levels 1-3, a growing number of peer-reviewed publication outputs had more than one author, involved authors from more than one Finnish university, and had co-authors affiliated with foreign institutions. The percentage indicates the change between 2011–2012 and 2016–2017. Total number of outputs: 184,105. Source: VIRTA Publication Information Service.

6.8. Multidisciplinarity

In this section, the development of the multidisciplinarity of Finnish universities' peer-reviewed outputs is analysed. However, in the case of multidisciplinarity the information base is relatively weak (Muhonen et al., 2016). To measure the multidisciplinarity of peer-reviewed publications, we use the average number of fields indicated in VIRTA for each publication. It is obligatory for universities to give each publication at least one field, but up to six can be given. According to the Publication data collection guide, "the field of science is not primarily determined based on the publication channel or the home department or unit of the authors but rather on the content of the specific publication".

The average number of fields indicated for peer-reviewed publications increased by 6%, from 1.3 in 2011–2012 to 1.4 in 2016–2017 (excluding Aalto) (Figure 6.13.). The average number of fields indicated for peer-reviewed outputs also increased at all JUFO levels (Figure 6.14.). However, there were considerable differences between organisations in the average number of fields assigned to outputs, and considerable changes have taken place during the period (Figure 6.13.). This may largely be due to organisational differences in the practices of reporting fields to publications. This was notably the case at Aalto, where a certain percentage of each publication used to be mechanically assigned to fields based on the organisational units.

Summary:

- In the available data for 2011-17, there were no signs of decline in multidisciplinarity of publishing activity of the Finnish universities.
- The average number of fields increased at all JUFO levels.
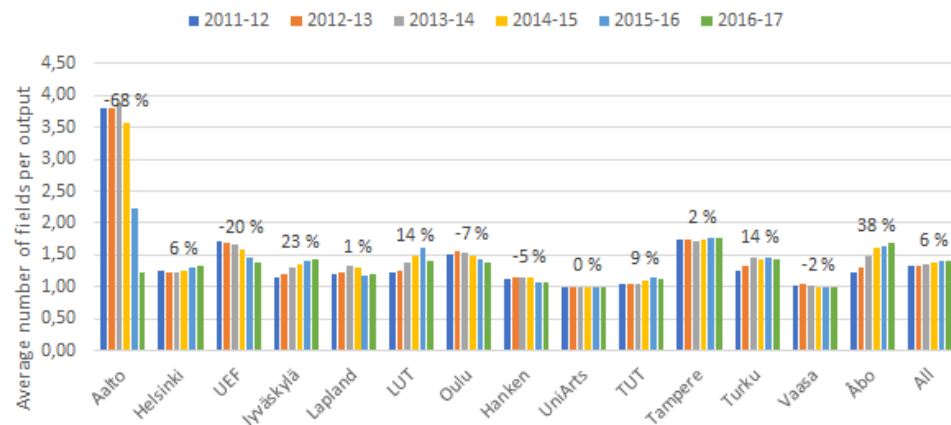
Figure 6.13. The number of (multi-disciplinary) fields tagged in peer-reviewed publications increased from 2011 to 2017 at most Finnish universities. The average for "All" universities is calculated excluding Aalto. The percentage indicates the change between 2011–2012 and 2016–2017. Total number of outputs: 184,105. Source: VIRTA Publication Information Service.
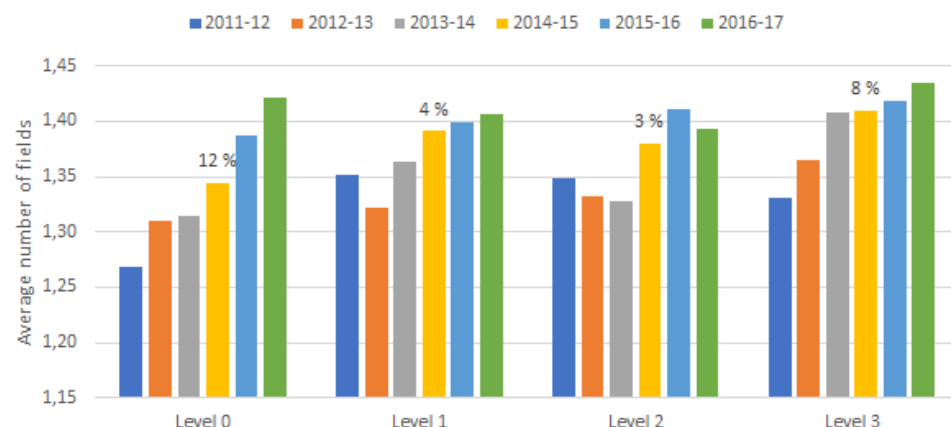
Figure 6.14. The average number of (multi-disciplinary) fields tagged in peer-reviewed publication outputs increased from 2011 to 2017 at all JUFO levels. The average is calculated excluding Aalto. The percentage indicates the change between 2011–2012 and 2016–2017. Total number of outputs: 160,962. Source: VIRTA Publication Information Service.

7. Recommendations

In this chapter, we conclude the self-evaluation by offering 12 recommendations and seven considerations for the improvement of the Publication Forum operations, the JUFO classification, and its use (Table 7.1.).

Table 7.1. Recommendations and considerations

Recommendations (=R with blue background) and Considerations (=C with green background)			Report sections
Stakeholders			
R	1.	**Research performing and funding organisations** should commit to the National Recommendations for *Good practice in Researcher Evaluation* (Federation of Finnish Learned Societies, 2020), as well as follow the *User Guide for the Publication Forum Classification* (JUFO, 2020) regarding the responsible use of the JUFO levels in different evaluation contexts. The **JUFO Steering Group** should consult various stakeholders when updating the latter guideline.	Chapter 5
R	2.	**The JUFO secretariat** should establish a systematic annual monitoring of the quality and open access of publication channels used by the Finnish researchers. This should be done in collaboration with relevant stakeholders, following the national *Policy for Open access to Scholarly Publications* (Open Science coordination, 2019). The monitoring efforts should focus on the diversity and open access of publication outputs, as well as the use of JUFO levels as a quality indicator. (Requires additional resources for the JUFO secretariat).	Chapter 3.1. Chapter 6.6.
C	1.	**The Ministry of Education and Culture** should consider increasing communication between the (i) Ministry's working group(s) tasked with the development of the publication performance indicator of the Ministry's funding model, and (ii) JUFO Steering Group tasked with the development of the JUFO classification of publication channels.	Chapter 5

C	2.	**The JUFO Steering Group** should consider promoting the use of JUFO classification of publication channels in new macro-level analyses (e.g., analyses of scholarly publishing at country and institutional levels; institutional research assessments; monitoring related to Research.fi).	Chapter 5
JUFO levels			
R	3.	**The JUFO Steering Group** should retain the current number of JUFO levels (0, 1, 2, 3) intact, as there is no wide consensus about the need to remove level 3 from the JUFO classification.	Chapter 4.3.
R	4.	**The JUFO Steering Group** should increase the publication volume share of JUFO level 2 and 3 journals/series to improve the equal treatment of various sub-fields of research.	Chapter 4.3.
R	5.	**JUFO Steering Group** should include, in JUFO-portal, more information about the reasons why particular publication channels are assigned to JUFO level 0 (incl. information clearly distinguishing questionable channels from legitimate channels).	Chapter 4.2.
R	6.	**The JUFO Steering Group** should facilitate Expert Panel decision making by clarifying and prioritising publication channel evaluation criteria, clearly communicating policy considerations (related to e.g. national languages and open access), and – if required – establishing clearer minimum requirements even for JUFO levels 2 and 3.	Chapter 4.3.
C	3.	**The JUFO Steering Group** should explore possibilities for increasing the balance between publication types, possibly by decreasing the number of book publishers at JUFO levels 2 and 3, or by increasing the publication volume share of JUFO level 2 and 3 journals/series.	Chapter 4.5.
C	4.	**The JUFO Steering Group** should explore possibilities for using the national publication volume (in addition to or instead of the world total publication volume) in calculating JUFO level 2 and 3 quotas. The aim would be to balance the JUFO levels between fields and publication types, as well as to reduce the effect of large publication volumes on evaluation. At the same time, the possibility for incremental annual updating of levels 2 and 3 (instead of a large review every four years) should be considered.	Chapter 4.3.

Panel work			
R	7.	**The JUFO Secretariat** should decrease the workload of expert panellists by improving the information base supporting channel evaluation, taking administrative decisions regarding JUFO levels 0 and 1, and assisting expert assessment with automated rankings (this requires additional resourcesto the JUFO secretariat: three full-time employees instead of current two).	Chapter 3.3. Chapter 3.6.
R	8.	**The JUFO Secretariat** should systematise the process of gathering information about conficting engagements by expert panellists and improve the information register about the panellists' memberships of editorial boards of publication channels, as well as their own publications in the channels.	Chapter 4.4.
R	9.	**The JUFO Steering Group** should explore possibilities for using international experts in the JUFO expert panels, for example, in collaboration with the Nordic countries using national publication channel lists.	Chapter 2.4.
C	5.	**The JUFO secretariat and Panels** should explore possibilities for increasing communication between the Expert Panels and the research community (e.g.,-public discussions organised and facilitated by JUFO in collaboration with learned societies).	Chapter 3.3. Chapter 4.4.
JUFO portal			
R	10.	**The JUFO secretariat** should further improve the transparency of the expert evaluation by making all the information supporting the expert evaluations, as well as panels' grounds for level assignments, available in the JUFO portal to members of the research community (Requires additional resources for for CSC and JUFO Secretariat).	Chapter 3.4.
R	11.	**The JUFO secretariat** should extend JUFO portal services with more comprehensive open access information for researchers, including OA publishing options, the benefits provided by FinELib, and research funder requirements (e.g. Plan S) (Requires additional resources for CSC and JUFO secretariat).	Chapter 3.4.

R	12.	**The JUFO secretariat** should develop international infrastructures (e.g., the Nordic list), collaboration, and research (e.g., identification of questionable journals) to support evaluation of publication channels, as well as to advance responsible assessment culture (requires additional resources for the JUFO secretariat).	Chapter 2.4. Chapter 3.4. Chapter 4.4.
C	6.	**The JUFO secretariat** should explore possibilities for new automated rules, analysis tools, and visualisations to facilitate the work of expert panellists and allow the research community to compare JUFO levels in specific fields according to all supporting information (e.g., journal metrics and Nordic-level ratings) (Requires additional resources for CSC and JUFO Secretariat).	Chapter 3.4.
C	7.	**The Ministry of Education and Culture** should consider how to ensure sufficient resources to secure the stability and availability of basic operational functionalities of the JUFO portal, as well as the development of the new services for expert panellists and members of the research community.	Chapter 3.4.

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Appendices

Appendix 1: Supplementary figures and tables

1. Introduction

Table 1: Universities Finland 2010 working-group's SWOT analysis of a publication forum-based system.

Strengths	Weaknesses
• promotes quality	• burdensome expert-panel organisation
• quality defined by research community	• panels tie human resources
• sensitive to different publishing practices	• requires harmonization of publication data renewal of field-classification (in Finland)
• could be established e.g. only for SSH fields	• validity may differ between fields
• transparent indication of quality	
• takes into account quantity and quality	
• comprehensive information for all fields	
• dynamic system that can be updated	
Opportunities	**Threats**
• current data about research quality	• experts privilege channels of national interest over quality in ratings
• supports research assessments	• ensuring commensurability
• steering and management	• difficult to reach consensus about ratings
• field and subfield specific analyses	

Table 2: objectives of the evaluation of publication indicator in Denmark and Norway

Denmark 2012	Norway 2014
• To what extent has the introduction of the bibliometric research indicator met the positive incentive effects and to what extent the indicator has had negative incentive effects?	• Effects of the Indicator - the Indicator's impact on publishing patterns, including: the quantity of publication; whether the quality intention is safeguarded; indicator transparency; Norwegian language publishing, and length of articles and monographs. Impact on research, including: the organization and attention given to research, and risk-taking in research.
• More focus on research?	
• Increased scientific production?	
• Increased publication in the most reputable journals?	
• Increased visibility for humanities and social science research results?	• Features of the Indicator - whether the publication levels serve as a satisfactory quality indicator, whether it is neutral across disciplines, reporting of books after 2010, and similarities / differences with other countries' publishing indicators.
• Increased quality assurance of scientific publications at Danish publishers?	
• Several publications with minimal content?	
• Lack of stimulation of interdisciplinarity?	• Organization of the Indicator - the disciplinary and administrative organization of the Publishing Indicator
• Decline in publishing in Danish?	
• Lack of stimulation of collaboration (because of fractionalization)?	• Use of the Indicator - the use of the Indicator at the faculty, department, group and individual levels, and the use of the Indicator in recruitment, assessment of staff qualifications and salary negotiations.
• What effects has the introduction of similar systems had in other countries where the system has worked for longer than in Denmark?	
• How does the Danish research indicator position itself in an international context?	

3. Administration and organisation

Table 3: Bibliographic and bibliometric information maintained and updated in the JUFO register

Field	Content	Source	Secretariat
Jufo_ID	Unique channel identifier	JUFO register	
Level	Current level	JUFO portal	Yes
Name	Name	ISSN/ISBN portal	Yes
Abbreviation	Conference abbreviation		Yes
Other_Title	Other language title or form	ISSN portal	Yes
Title_Details	Comments on the title		Yes
ISSNL	ISSNL	ISSN portal	Yes
ISSN1	ISSN-print	ISSN portal	Yes
ISSN2	ISSN-online	ISSN portal	Yes
ISBN	ISBN-codes	ISBN portal	Yes
Continues	Jufo_ID of the predecessor	ISSN portal	Yes
Continued_by	Jufo_ID of the successor	ISSN portal	Yes
Type	Journal/series, Conference, or Book publisher		Yes
Website	WWW-link		Yes
Country	Publishing country	ISSN portal	Yes
Publisher	Publisher (and society)	ISSN portal	Yes
Language	Publishing languages	ISSN portal	Yes
Year_Start	Start year	ISSN portal	Yes
Year_End	End year	ISSN portal	Yes
Active	Active if no end year, Inactive if end year		Yes
Norway_Level	Norwegial levels	Norwegian register	
Denmark_Level	Danish levels	Danish register	
SJR_SJR	Scimago Journal Rank	Scopus journal metrics	
SNIP	Source Normalized Impact per Paper	Scopus journal metrics	
IPP	CiteScore	Scopus journal metrics	
WoS_index	1 = indexed in Web of Science	WoS master journal list	
Scopus_index	1 = indexed in Scopus	Scopus journal metrics	
ERIHplus	1 = indexed in ERIH PLus	ERIH PLus	
DOAJ_Index	1 = indexed in DOAJ	DOAJ	
Jfi_Index	1 = indexed in Journal.fi	Journal.fi	
Bfeld_Index	1 = indexed in Bielefeld list	Bielefeld list	
Virta_Gold	1 indicates Virta gold channel	VIRTA	
Virta_Hybrid	1 indicates Virta hybrid channel	VIRTA	
Virta_Green	1 indicates Virta green channel	VIRTA	
Sherpa_Romeo_Code	Green, Blue, Yellow, White	Sherpa/Romeo	
Predator	1 = questionable channels	Cabell's and DOAJ removed	Yes
Active_Binary	1 = included, 0 excluded channels (e.g. duplicates)		Yes
Grounds_removal	Grounds for Active_binary 0		Yes
Panel_1-24	1 = included in panel X list		Yes
Fields	Codes for ERIH, Norwegian, Danish, WOS, Sopus, and OKM -fields		Yes
Scientific	1 Indicates scientific publications channel		Yes
Professional	1 indicates professional publication channel		Yes
General	1 indicates general public publication channel		Yes
Jufo_History	All time jufo levels	JUFO portal	
Volume	Average annual world production	Scopus journal metrics	Yes

6. Development of publishing in Finland 2011-2017

See Figures 1-14 on pages 91-94.
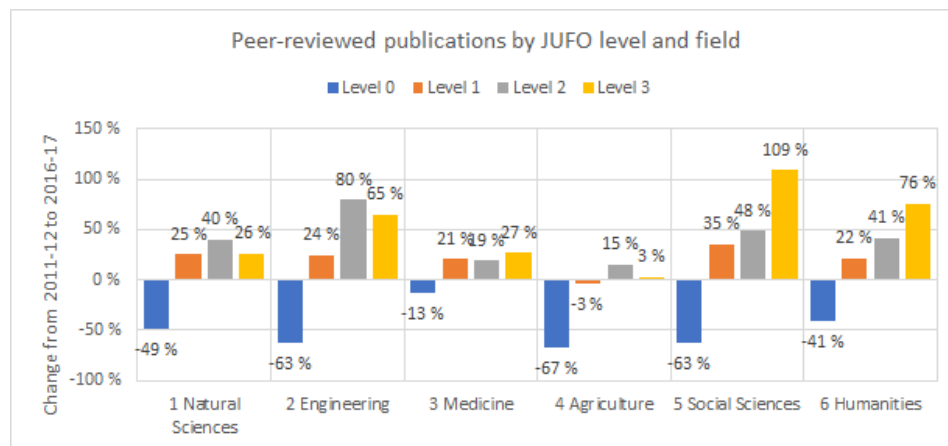
Figure 1. The number of peer-reviewed outputs on level 0 has decreased in all fields and the number of outputs on levels 1, 2 and 3 has increased in all fields with the exception of Agriculture where there is decline on level 1. Percentage indicates the change from period 2011-2012 to 2016-2017. Total number of outputs: 105499. Source: VIRTA Publication information service.
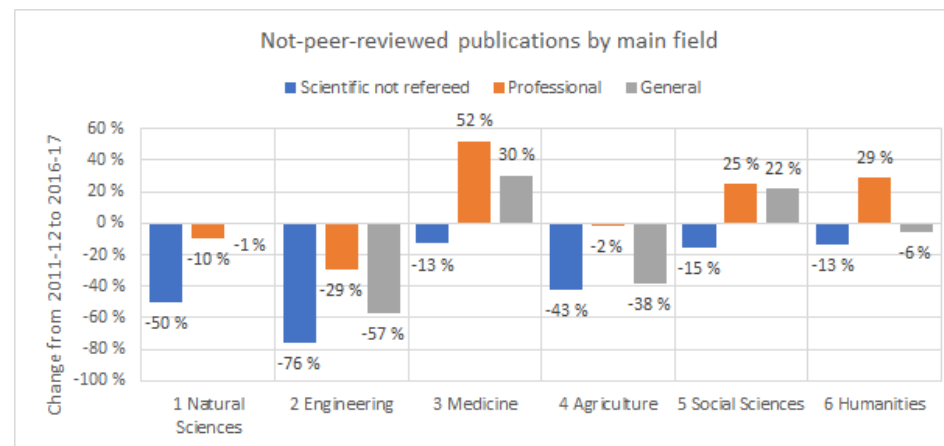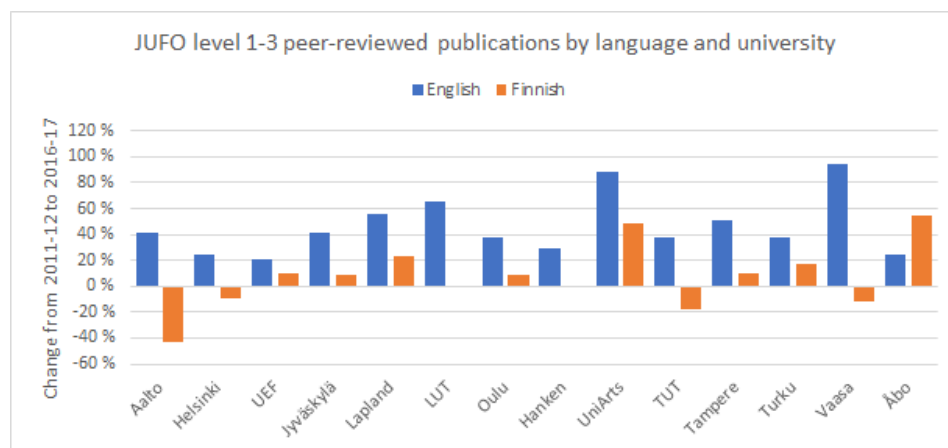

Figure 3. The number of not peer-reviewed outputs in academic/scholarly channels has decreased in all fields. There are considerable differences between fields in the development of a number of professional and general outputs. Percentage indicates the change from period 2011-2012 to 2016-2017. Total number of outputs: 47506. Source: VIRTA Publication information service.
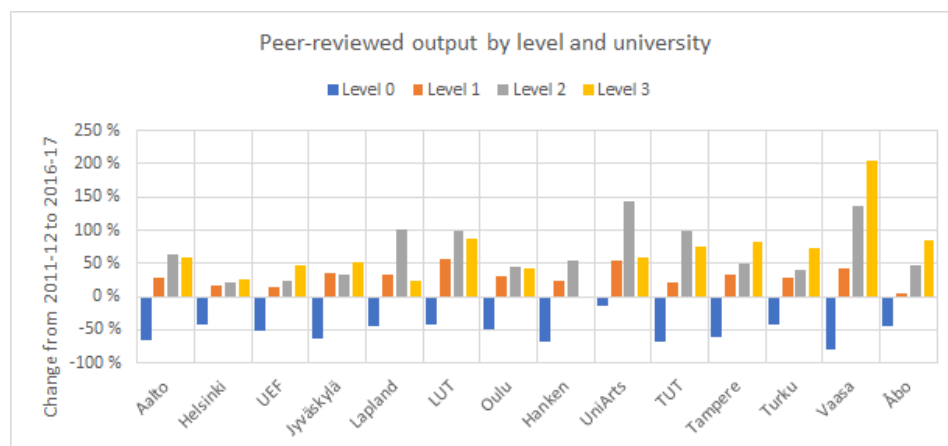
Figure 2. All universities have decreased the number of level 0 peer-reviewed outputs and increased the number of level 1, 2 and 3 outputs. Percentage indicates the change from period 2011-2012 to 2016-2017. Total number of outputs: 105499. Source: VIRTA Publication information service.
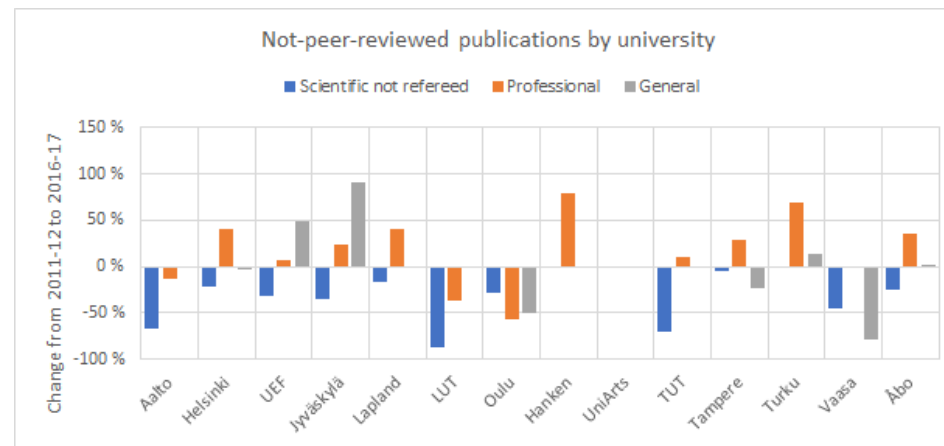
Figure 4. All universities have decreased the number of not-refereed outputs for scientific audiences and most universities have increased the number of outputs for professional audiences. Percentage indicates the change from period 2011-2012 to 2016-2017. Total number of outputs: 47506. Source: VIRTA Publication information service.
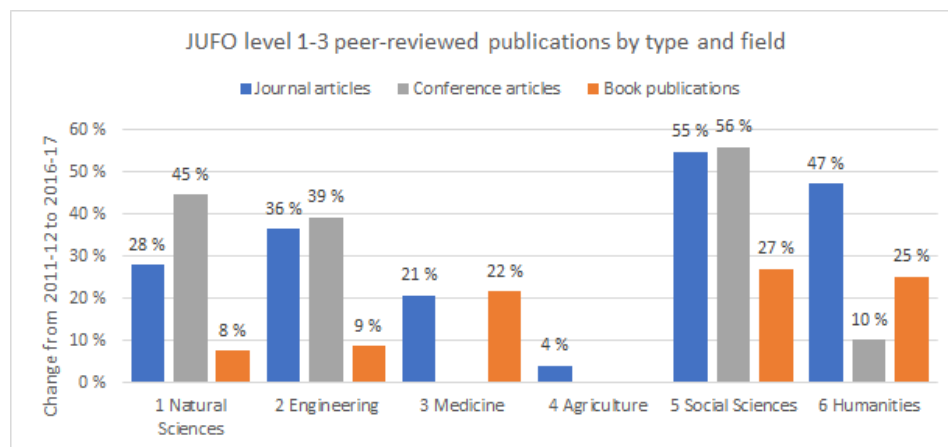
Figure 5. The number of all publication types has increased in all fields where there are enough outputs of the given publication types at level 1-3 channels. Percentage indicates the change from period 2011-2012 to 2016-2017. Total number of outputs: 105499. Source: VIRTA Publication information service.
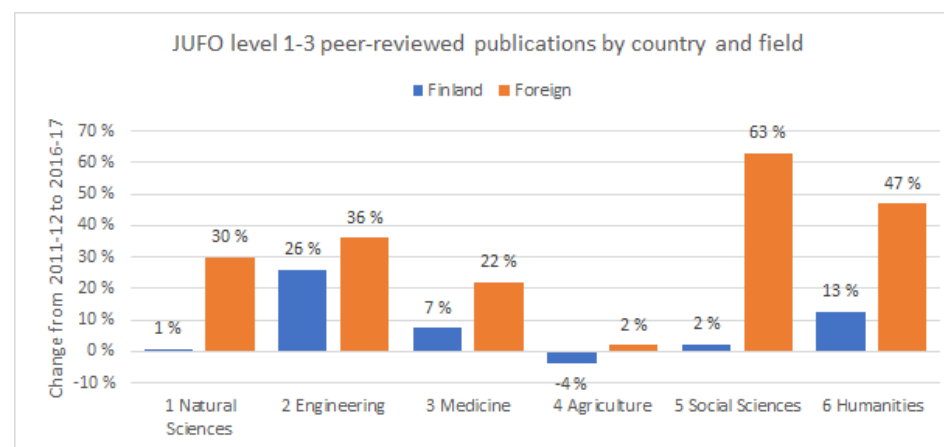
Figure 7. There are only small changes to the number of peer-reviewed outputs in Agriculture in both domestic and foreign outputs. In other fields there is a strong increase in foreign outputs, and less increase in domestic outputs. Percentage indicates the change from period 2011-2012 to 2016-2017. Total number of outputs: 105499. Source: VIRTA Publication information service.
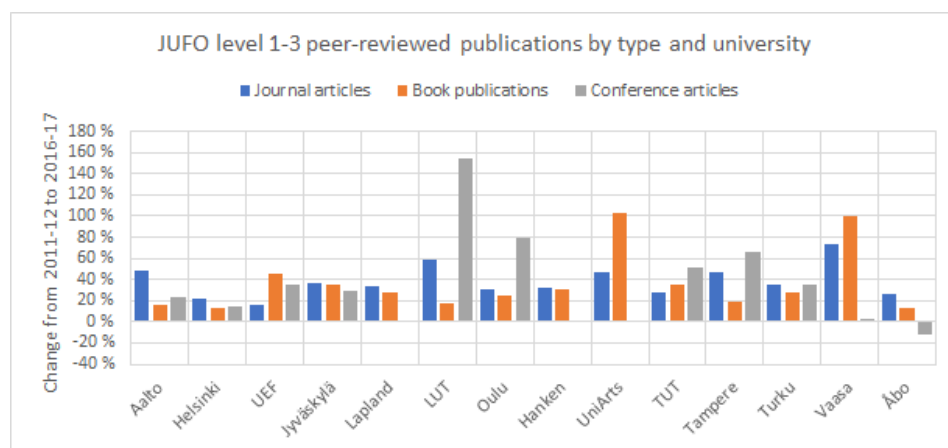
Figure 6. All universities have increased all publication types in level 1-3 channels, with the exception of a small decrease in the number of conference articles at Åbo Universitet. Percentage indicates the change from period 2011-2012 to 2016-2017. Total number of outputs: 105499. Source: VIRTA Publication information service.
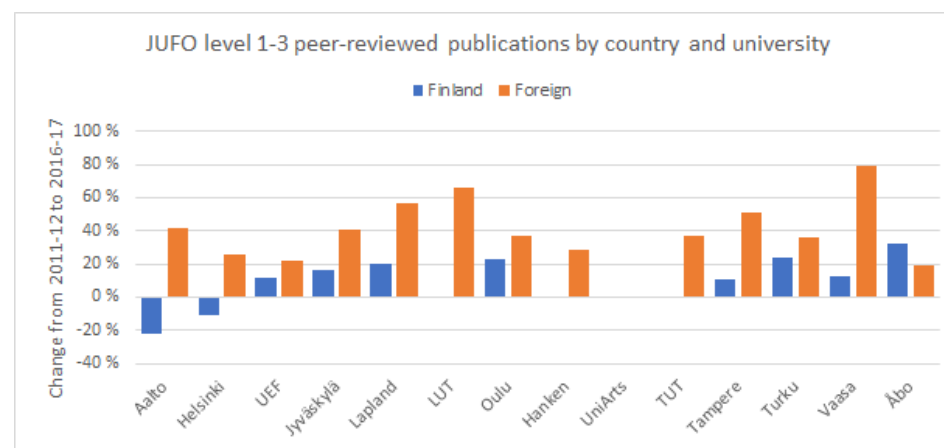
Figure 8. The number of domestic outputs has decreased only in Aalto and Helsinki, while that of outputs in foreign channels has increased in all universities. Percentage indicates the change from period 2011-2012 to 2016-2017. Total number of outputs: 105499. Source: VIRTA Publication information service.
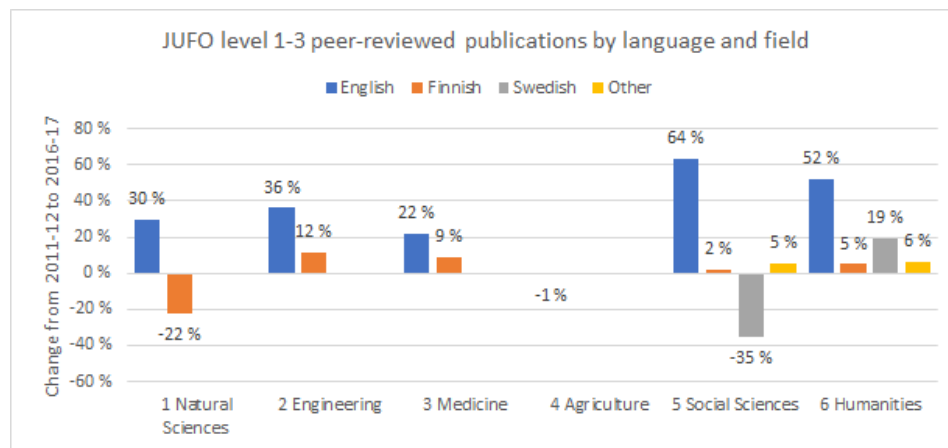
Figure 9. The number of English language outputs has increased in all fields except Agriculture (for other languages the number of outputs is very small in Agriculture). The number of Finnish language outputs has slightly increased, except in Natural sciences. For Swedish and other languages the number of outputs is very small in STEM fields. Percentage indicates the change from period 2011-2012 to 2016-2017.Total number of outputs: 105499. Source: VIRTA Publication information service.
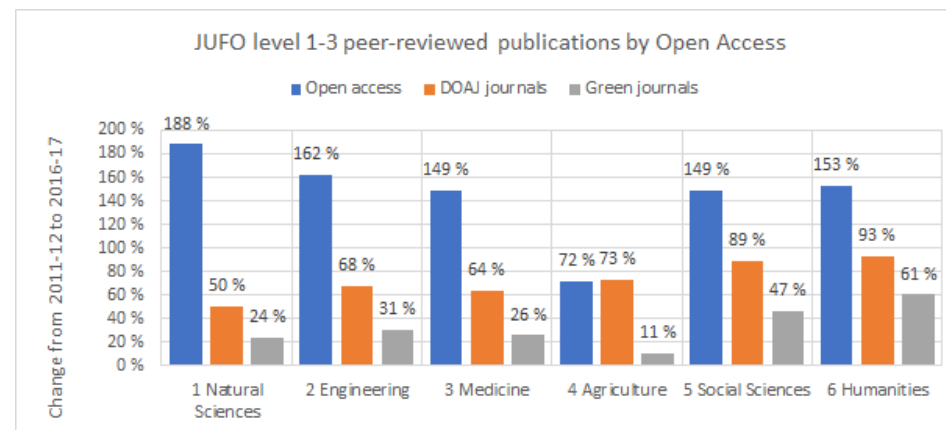
Figure 11. The number of open available outputs has increased strongly in all fields. Also publishing in DOAJ indexed journals as well as in Green journals has increased in all fields. Percentage indicates the change from period 2011-2012 to 2016-2017. Total number of outputs: 105499. Source: VIRTA Publication information service.

Figure 10. Number of peer-reviewed English language outputs in level 1-3 channels has increased in all universities. The number of peer-reviewed Finnish language outputs has also increased in most universities. Percentage indicates the change from period 2011-2012 to 2016-2017. Total number of outputs: 105499. Source: VIRTA Publication information service.
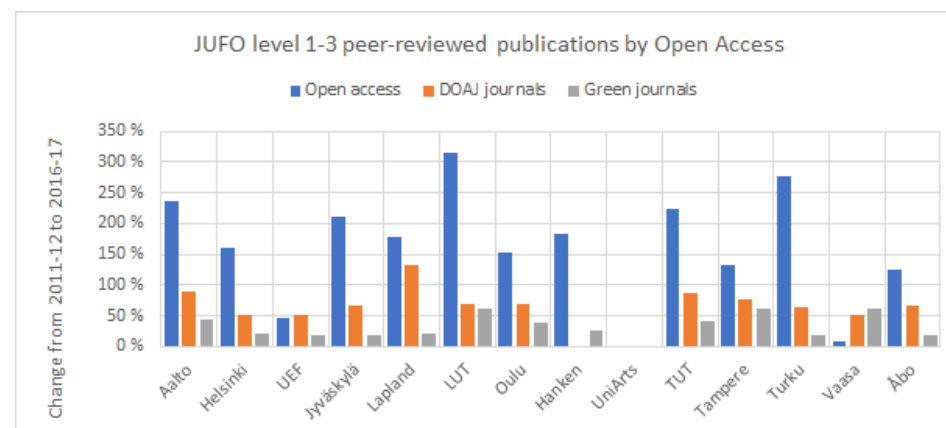
Figure 12. The number of openly available outputs has increased strongly in all universities. Percentage indicates the change from period 2011-2012 to 2016-2017. Total number of outputs: 105499. Source: VIRTA Publication information service.
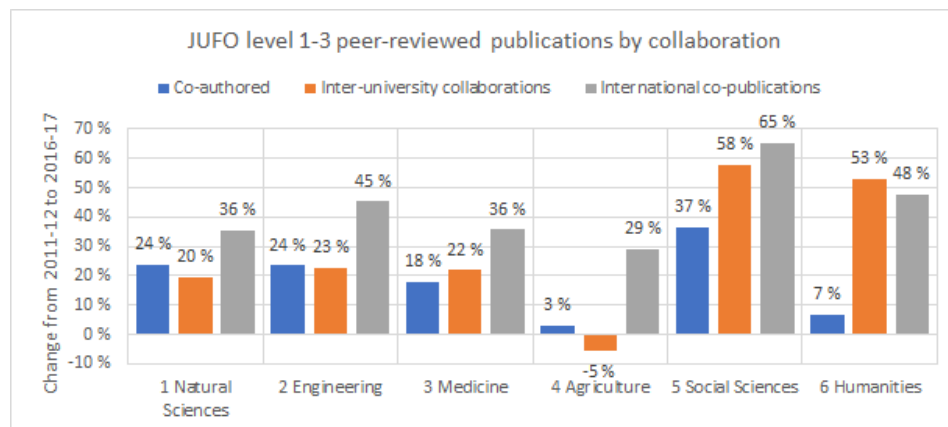
Figure 13. The number of outputs with all three types of collaboration (co-authorship, inter-university collaboration, international co-publications) has increased in almost all fields. Only in Agriculture there is a slight decrease in inter-university collaborations. Percentage indicates the change from period 2011-2012 to 2016-2017. Total number of outputs: 105499. Source: VIRTA Publication information service.
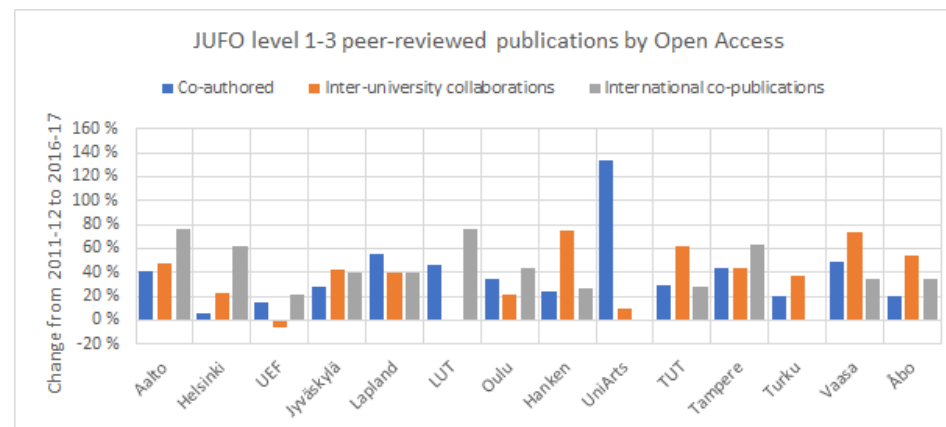
Figure 14. Also almost all universities have increased all types of collaborative outputs. The sole exception is that output involving inter-university collaboration has slightly decreased at University of Eastern Finland (UEF). Percentage indicates the change from period 2011-2012 to 2016-2017. Total number of outputs: 105499. Source: VIRTA Publication information service.

Appendix 2: Online panellist survey

The Publication Forum conducted an online survey to all experts who have acted as members of the evaluation panels between 2010 and 2019. The survey was open from 18th of June to 18th of August 2019. The invitation and link to the survey was sent to 506 persons, of whom 170 (33%) provided a complete response.

1. Respondents

Key findings:

- Respondents include 33 % of all 509 members of the expert panels
- 61 % of the respondents represent the current panels for 2018-21
- Respondents represent both STEM and SSH panels adequately.

As a background information the panellists provided their name, panel and term. The 170 respondents include members from all 23 panels, ranging between 4 members from panel 10 and 15 members from panel 21 (Table 1). Overall, 103 (61 %) respondents are from STEM panels 1-15 and 67 (39 %) from the SSH panels 16-23. Current panels for the term 2018-21 have 246 active members, of which 152 representing STEM (62 %) and 94 SSH (38 %). The respondents

The respondents have been panel members at different times: 35 % were in the panel during the term 2010-13, 36 % during 2014-17, and 61 % during the current term 2018-19. Some panellists have been in the panels more than one term: 72 % have been in the panel only one term, 25 % during two terms, and 4 % during three terms.

Table 1. Survey respondents.

Panel	2010-13	2014-17	2018-19	All
1 Mathematics and statistics	1	0	4	5
2 Computer and information sciences	4	5	5	8
3 Physical sciences, space science and astronomy	2	3	2	5
4 Chemical sciences	5	5	4	11
5 Geosciences and environmental sciences	2	2	6	8
6 Biosciences I	2	4	4	8
7 Biosciences II	4	3	7	10
8 Civil and mechanical engineering	1	1	4	5
9 Electrical and Electronic engineering, information engineering	1	0	5	6
10 Chemical engineering, materials engineering and environmental engineering	1	1	4	4
11 Medical engineering, biotechnology and basic medicine	1	3	4	6
12 Clinical medicine I	3	3	1	5
13 Clinical medicine II and dentistry	3	4	6	10
14 Health sciences and other medical sciences	1	1	4	5
15 Agricultural sciences	3	2	4	7
16 Economics and business	5	4	4	9
17 Social sciences, media and communications, interdisciplinary social sciences	7	2	5	12
18 Psychology and educational sciences	2	4	8	9
19 Political science, public administration and law	2	3	3	6
20 Philosophy and theology	1	2	5	6
21 Languages	3	3	10	15
22 Literature, arts and architecture	3	4	3	5
23 History, archaeology and cultural studies	2	2	2	5
All respondents	59	61	104	170

2. Number of panels

Publication channels are evaluated in 23 field-specific expert-panels.

Key findings:

- 78 % of respondents (and 87 % from the current term 2018-19) answered that their panel is of the right size (Figure 1).
- There is no urgent need to change the panel structure.

Questions:

- Is your panel's scope in terms of field of expertise about the right size with regard to the evaluation task? Would it be better, if your panel would be merged with one or more panels, or if your panel would be divided to two or more panels? Please choose only one of the following:
    - Panel is of the right size
    - Panel should be merged
    - Panel should be divided
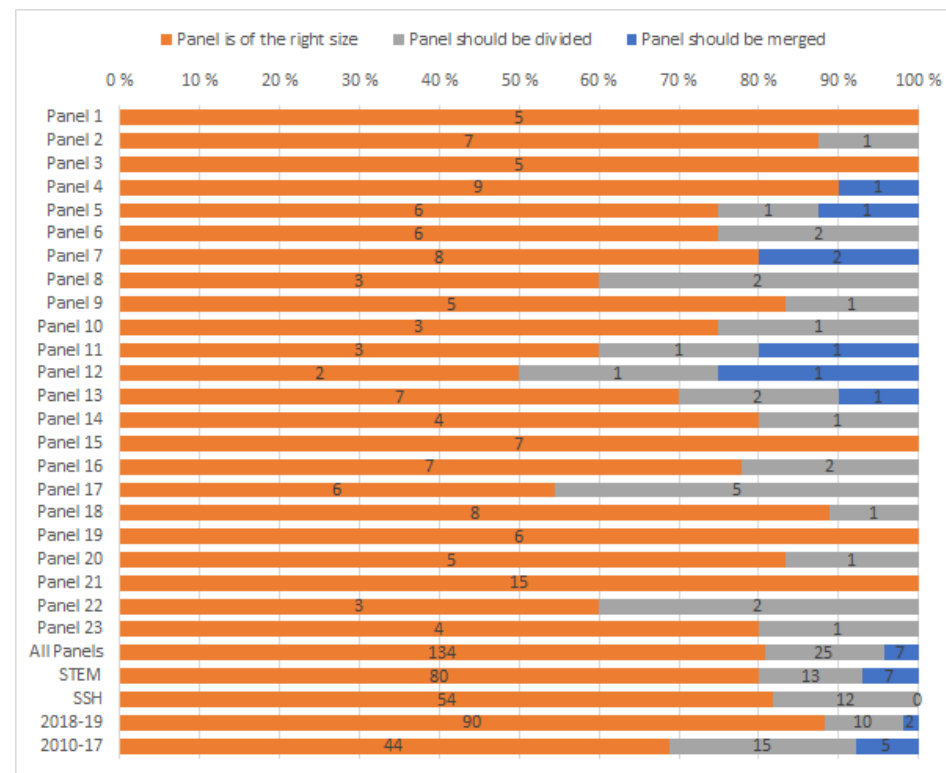
Figure 1. Answers to question "Is your panel's scope in terms of field of expertise about the right size with regard to the evaluation task? Would it be better, if your panel would be merged with one or more panels, or if your panel would be divided to two or more panels?". 78 % of the respondents answered that their panel is of the right size. Number of responses: 166. Source: Online survey to Publication Forum panellists.

3. Number of panellists

Expert-panels have about 7-12 members.

Key findings:

- 85 % of respondents (and 88 % from the current term 2018-19) answered that the number of experts in their panel to be adequate (Figure 2).
- There is no urgent need to change the number of panellists.

Questions:

- Is the number of experts in your panel suitable for the evaluation task, or would it be better if the number was increased or decreased? Please choose only one of the following:
    - Panel has the right number of members
    - Number of panellists should be increased
    - Number of panellists should be decreased
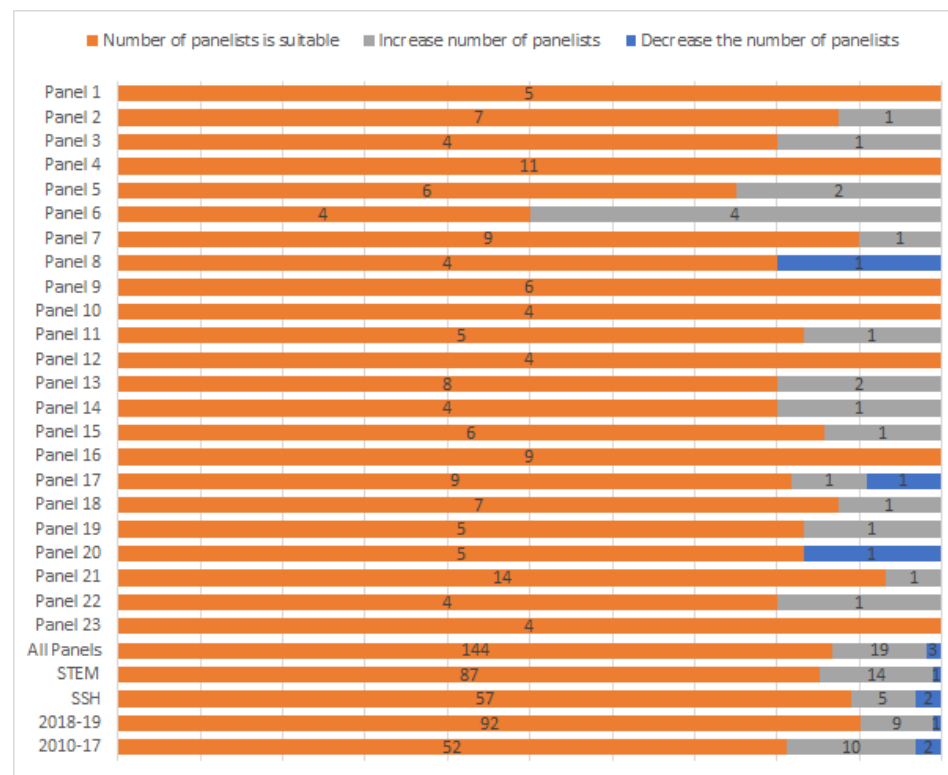
Figure 2. Answers to question "Is the number of experts in your panel suitable for the evaluation task, or would it be better if the number was increased or decreased?". 85 % of respondents answered that the number of experts in their panel to be adequate. Number of responses: 166. Source: Online survey to Publication Forum panellists.

4. Number of JUFO levels

Publication channels are now divided into four levels: 0, 1, 2 and 3.

Key findings:

- 89 % of respondents (and 88 % from the current term 2018-19) answered that either 4 JUFO levels (0, 1, 2, 3) or 3 JUFO levels (0, 1, 2) are needed (Figure 3).
- 46 % of respondents favour 4 JUFO levels and 41 % 3 JUFO levels, however only 37 % of the panellists from the current term 2018-19 support 4 levels and 51 % support 3 levels.
- Respondents from the current 2018-19 SSH panels are more favourable to 3 levels (61 % vs. 28 % 4 levels) than those from the STEM panels (45 % vs. 42 % 4 levels).

Questions:

- Do you think the number of level categories is appropriate, or should their number be increased or decreased? How many levels are needed? Please choose only one of the following:
  - More than 4 levels
  - 4 levels (0, 1, 2, 3)
  - 3 levels (0, 1, 2)
  - 2 levels (0, 1)
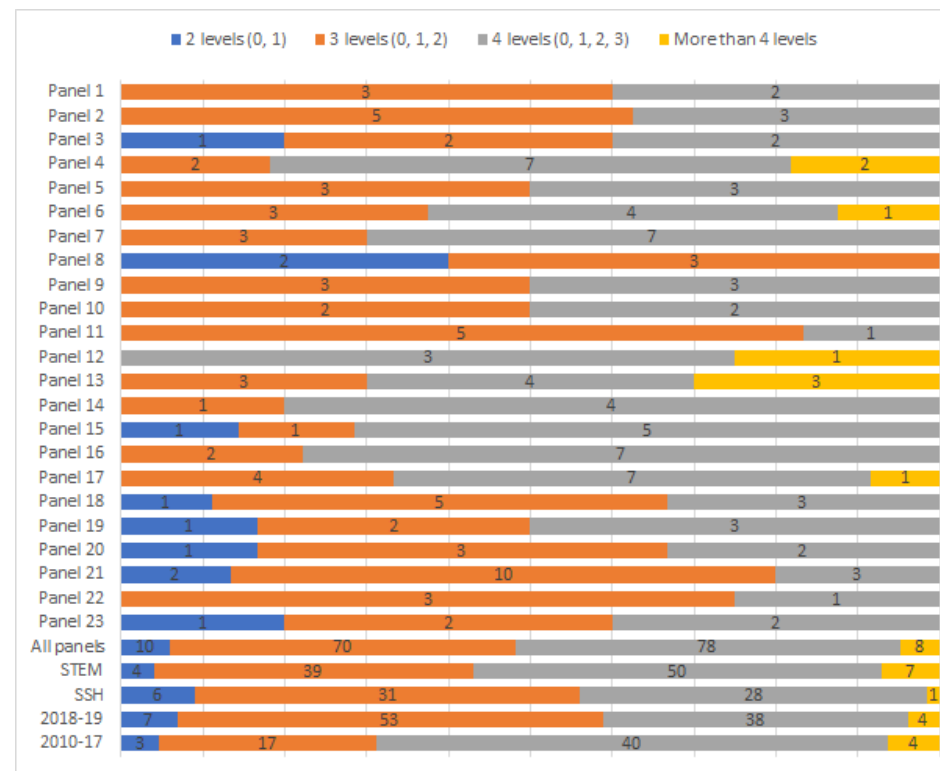
Figure 3. Answers to question "Do you think the number of level categories is appropriate, or should their number be increased or decreased? How many levels are needed?". 46 % of respondents favour 4 JUFO levels and 41 % 3 JUFO levels. Number of responses: 166. Source: Online survey to Publication Forum panellists.

5. Importance of distinction between JUFO levels 0-3

In the complementary evaluation, it is the task of the panel to decide whether the publication channel meets the criteria for level 1: is specialized in publishing of scientific research results, has an editorial board of experts in the field, and a regular peer review. If the channel does not meet these conditions, or is new, local or questionable ("predatory"), it will be placed in level 0. In the review of ratings, it is the task of the panel to identify leading publication channels to level 2 and the top channels to level 3.

Key findings:

- 94% of respondents answered (4-5) that the distinction between JUFO levels 0-1 is important or very important (Figure 4), and more important than distinction between JUFO levels 1-2 (74 %) (Figure 5) or JUFO levels 2-3 (35 %) (Figure 6).
- Current panellists (term 2018-21) consider the level 0-1 distinction more important, and the level 2-3 distinction less important, than panellists from the previous terms (2010-17).
- Panellists from the SSH fields consider the level 2-3 distinction less important that panellists from the STEM fields.

Questions:

- Estimate on a scale of 1-5 how important you consider the distinction between level 0 and 1? (1 = not important - 5 = very important)
- Estimate on a scale of 1-5 how important you consider the distinction between level 1 and 2? (1 = not important - 5 = very important)
- Estimate on a scale of 1-5 how important you consider the distinction between level 2 and 3? (1 = not important - 5 = very important)
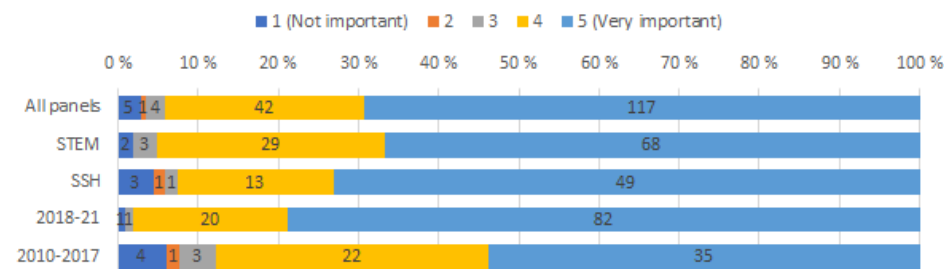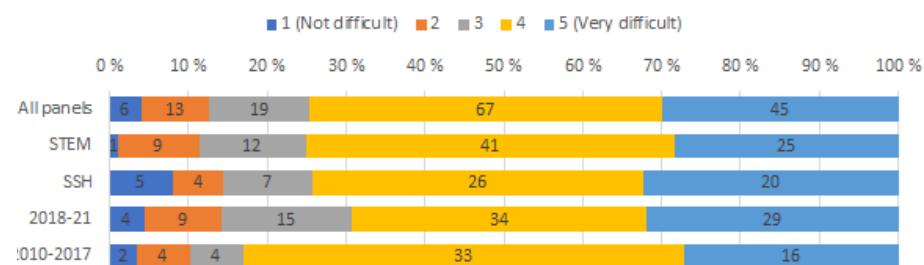

Figure 4. Answers to question "Estimate on a scale of 1-5 how important you consider the distinction between level 0 and 1?". 94% of respondents answered that the distinction between JUFO levels 0-1 is important or very important. Number of responses: 166. Source: Online survey to Publication Forum panellists.
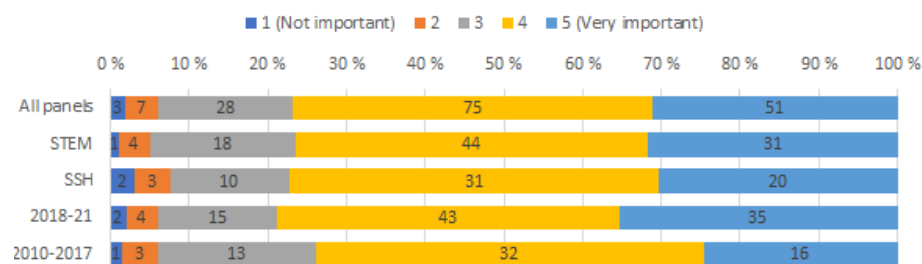
Figure 5. Answers to question "Estimate on a scale of 1-5 how important you consider the distinction between level 1 and 2?". 74% of respondents answered that the distinction between JUFO levels 1-2 is important or very important. Number of responses: 166. Source: Online survey to Publication Forum panellists.
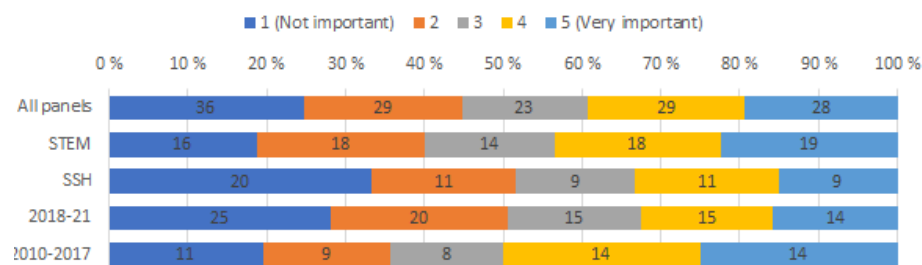
Figure 6. Answers to question "Estimate on a scale of 1-5 how important you consider the distinction between level 2 and 3?" 35% of respondents answered that distinction between JUFO levels 2-3 is important or very important. Number of responses: 166. Source: Online survey to Publication Forum panellists.

6. Difficulty of distinction between JUFO levels 0-3

Key findings:

- 66% of respondents answered (4-5) that the distinction between JUFO levels 2-3 is difficult or very difficult (Figure 9), and more difficult than distinction between JUFO levels 1-2 (38 %) (Figure 8) or JUFO levels 1-0 (10 %) (Figure 7).
- Overall, current panellists (term 2018-21) consider all the level distinctions less difficult than panellists from the previous terms (2010-17).
- Panellists from the SSH fields consider the level 0-1 distinction more often, and level 1-2 distinction less often, difficult or very difficult than panellists from the STEM fields.

Questions:

- Estimate on a scale of 1-5 how difficult you consider the distinction between level 0 and 1? (1 = not difficult - 5 = very difficult)
- Estimate on a scale of 1-5 how difficult you consider the distinction between level 1 and 2? (1 = not difficult - 5 = very difficult)
- Estimate on a scale of 1-5 how difficult you consider the distinction between level 2 and 3? (1 = not difficult - 5 = very difficult)
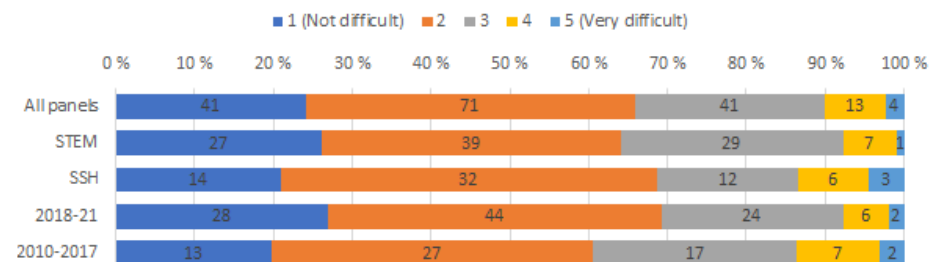
Figure 7. Answers to question "Estimate on a scale of 1-5 how difficult you consider the distinction between level 0 and 1?". 10% of respondents answered that distinction between JUFO 0 and 1 levels is difficult or very difficult. Number of responses: 166. Source: Online survey to Publication Forum panellists.
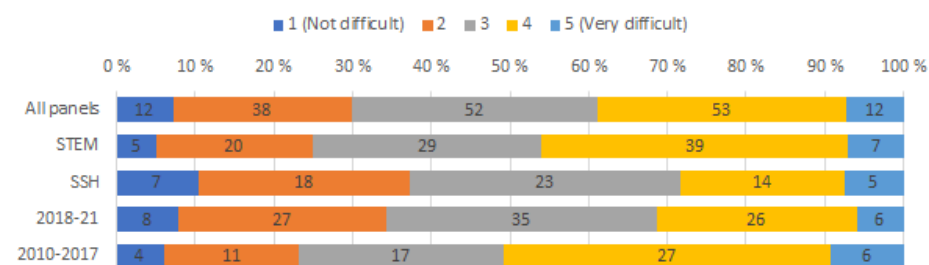
Figure 8. Answers to question "Estimate on a scale of 1-5 how important you consider the distinction between level 1 and 2?". 38% of respondents answered that distinction between JUFO 1 and 2 levels is difficult or very difficult. Number of responses: 166. Source: Online survey to Publication Forum panellists.

Figure 9. Answers to question "Estimate on a scale of 1-5 how important you consider the distinction between level 2 and 3?". 66% of respondents answered that distinction between JUFO 2 and 3 levels is difficult or very difficult. Number of responses: 166. Source: Online survey to Publication Forum panellists.

7. Consensus regarding panel decisions

The panel is collectively responsible for all level ratings.

Key findings:

- 86 % of respondents (and 89 % from the current term 2018-19) answered (1-3) that it is not difficult or very difficult for the panel to reach consensus regarding the ratings (Figure 10).
- 88 % of respondents (and 90 % from the current term 2018-19) answered (1-3) that they do not disagree often with the panel decision regarding the ratings (Figure 11).

Questions:

- Estimate on a scale 1-5 how difficult it has been - in general - for the panel to reach a consensus on ratings? (1 = not difficult to reach consensus - 5 = very difficult to reach consensus).
- Estimate on a scale 1-5 how often you disagree with the panel's decision? (1 = disagree rarely - 5 = disagree often).
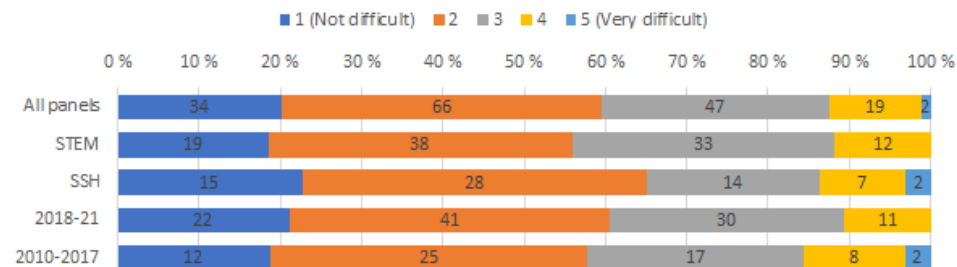
Figure 10. Answers to question "Estimate on a scale 1-5 how difficult it has been - in general - for the panel to reach a consensus on ratings". 86 % of respondents answered that it is not difficult or very difficult for the panel to reach consensus regarding the ratings. Number of responses: 166. Source: Online survey to Publication Forum panellists.
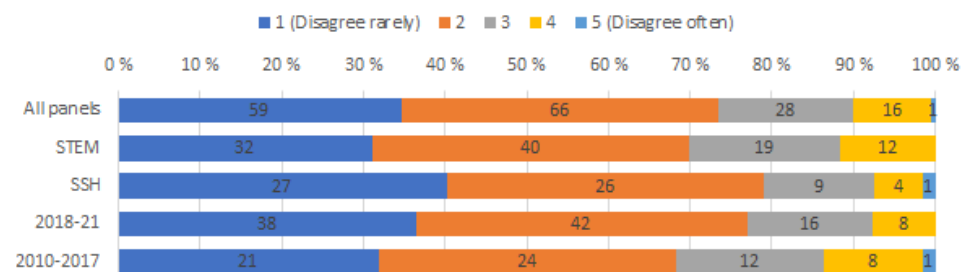
Figure 11. Answers to question "Estimate on a scale 1-5 how often you disagree with the panel's decision?". 88 % of respondents answered that they do not disagree often with the panel decision regarding the ratings. Number of responses: 166. Source: Online survey to Publication Forum panellists.

8. JUFO level 1 criteria

The checking of the level 1 criteria almost always requires the viewing of the website of the publication channel.

Key findings:

- It seems to be increasingly difficult to distinguish properly peer-reviewed and predatory journals, and to assess the relevance of the channel to Finnish research (Figures 12 and 13).

Questions:

- Estimate on a scale 1-5 how difficult it is to evaluate the fulfillment of different level 1 criteria? (1 = not difficult - 5 = very difficult)? Please choose the appropriate response for each item:
  - Scientific or non-scientific publication channel
  - Editorial board of experts in the field
  - Regular peer review procedure
  - Local channel used by researchers from one organization
  - Marginal channel for Finnish research
  - Predatory
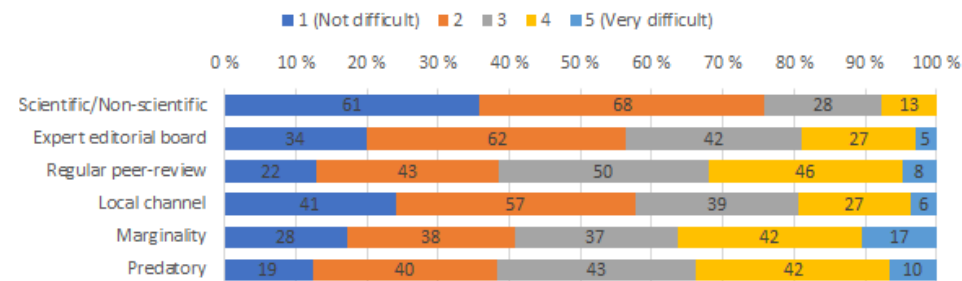
Figure 12. Answers to question "Estimate on a scale 1-5 how difficult it is to evaluate the fulfillment of different level 1 criteria?". The easiest level 1 criteria is to distinguish scientific and non-scientific publication channels. On the other hand, it is more difficult to distinguish regular peer-review, predatory journals, and to assess the relevance of the channel to Finnish research. Number of responses: 166. Source: Online survey to Publication Forum panellists.
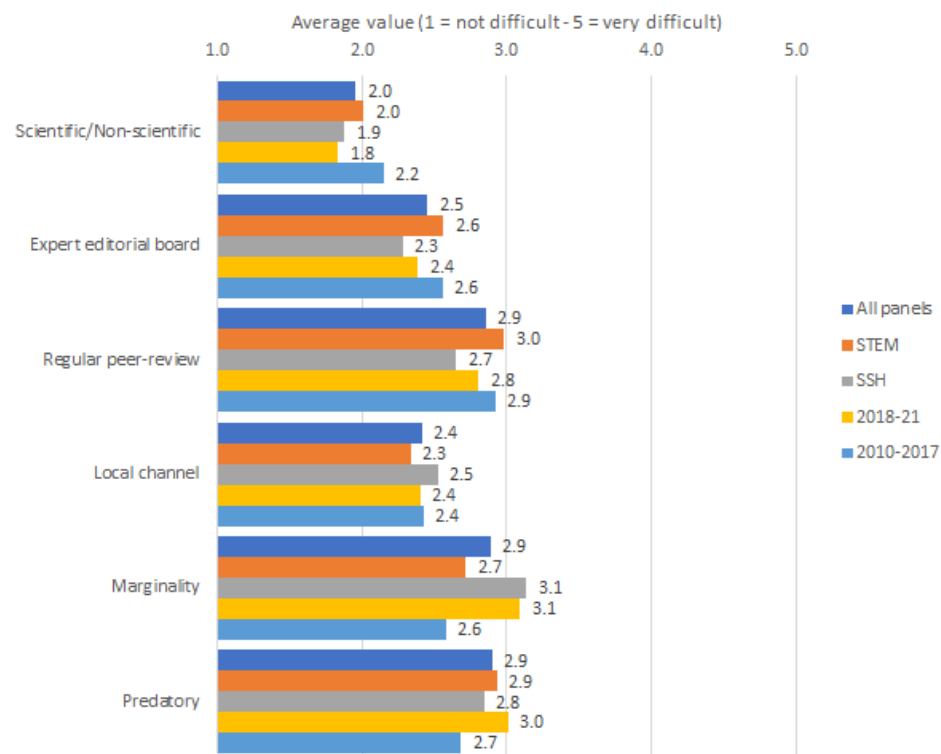
Figure 13. Average values to question "Estimate on a scale 1-5 how difficult it is to evaluate the fulfillment of different level 1 criteria?". The easiest level 1 criteria is to distinguish scientific and non-scientific publication channels. On the other hand, it is more difficult to distinguish regular peer-review, predatory journals, and to assess the relevance of the channel to Finnish research. Number of responses: 166. Source: Online survey to Publication Forum panellists.

9. Role of personal experience in evaluation

Classification of the publication channels is primarily based on expert evaluation.

Key findings:

- Personal experience of the publication channels' reputation in the research community is by far the most important consideration, especially among the current term panellists (2018-21) (Figures 14 and 15).
- Experience as an editor or member of the editorial board is least important, perhaps because panellists have less often this kind of experience, compared to experience as peer-reviewer or author.

Questions:

- Estimate on a scale of 1-5 how important do you consider your personal experience of the evaluated publication channel to be for the evaluation (1 = not important - 5 = very important)? Please choose the appropriate response for each item:
  - Experience as editor of the channel
  - Experience as member of the editorial board of the channel
  - Experience as peer-reviewer of the channel
  - Experience of the peer review as an author in the channel
  - Experience of using the research published in the channel
  - Reputation of the channel in the research community
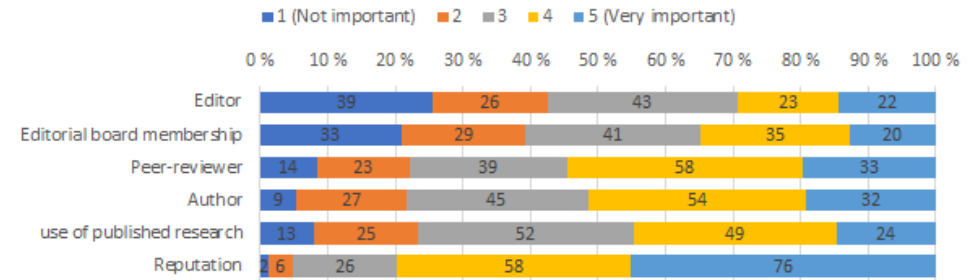
Figure 14. Answers to question "Estimate on a scale of 1-5 how important do you consider your personal experience of the evaluated publication channel to be for the evaluation?" Personal experience of the publication channels' reputation in the research community is the most important consideration. Number of responses: 166. Source: Online survey to Publication Forum panellists.
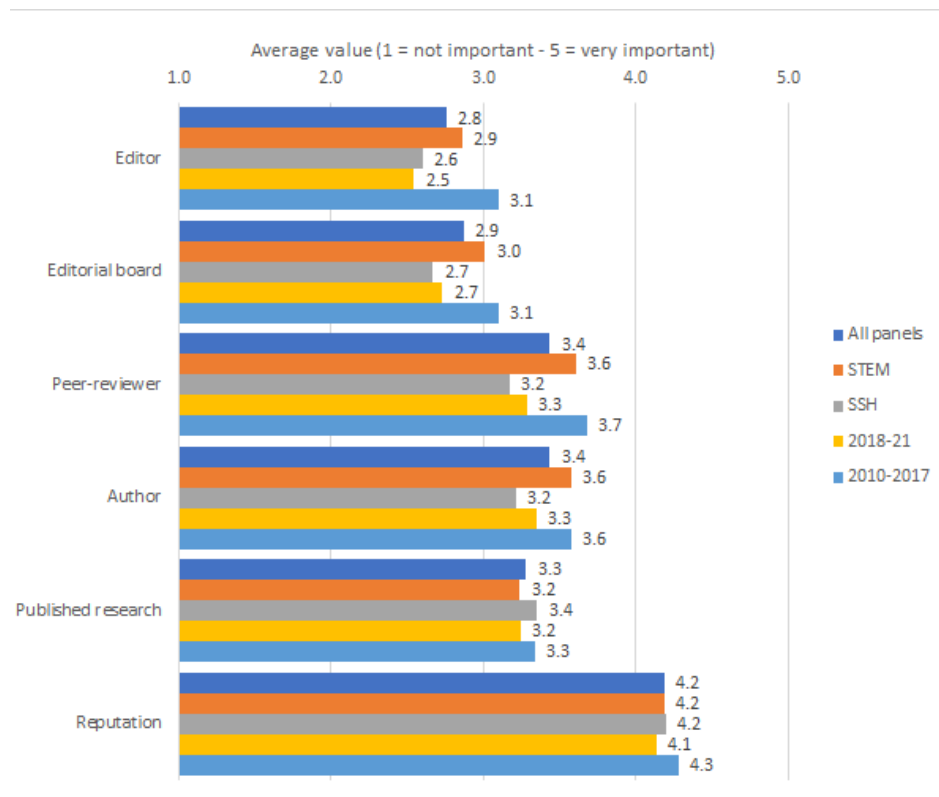
Figure 15. Average values to question "Estimate on a scale of 1-5 how important do you consider your personal experience of the evaluated publication channel to be for the evaluation?" Personal experience of the publication channels' reputation in the research community is the most important consideration. Number of responses: 166. Source: Online survey to Publication Forum panellists.

10. Knowledge of journals/series

Hundreds of publication series are being evaluated by panels.

Key findings:

- Panellists' personal experience covers on average 26 % of the journals of their field in the panel's list, typically ranging between 10 % and 30 % (Figures 16 and 17).
- Personal experience appears to cover a smaller share of the journals in the SSH panels than STEM, presumably because of the larger number of journals.
- Personal experience appears to cover a smaller share of the journals among the current panels (2018-21) than the previous panels (2010-17), perhaps due to the increasing number of journals.

Questions:

- Roughly how large is the share of the publication channels belonging to you field in your panel that you have personal experience of? Please choose only one of the following:
  - 100 %, 90 %, 80 %, 70 %, 60 %, 50 %, 40 %, 30 %, 20 %, 10 %, 0 %
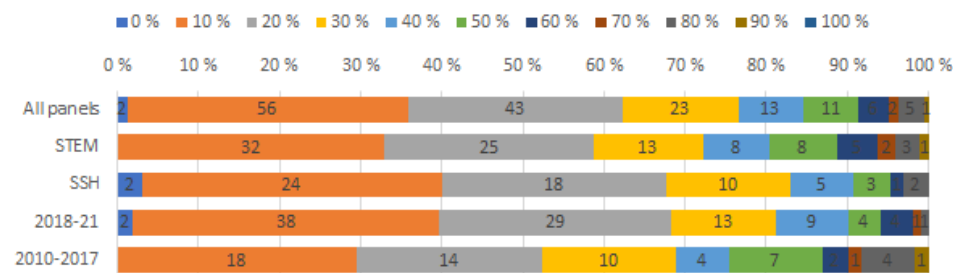
Figure 16. Answers to the question "Roughly how large is the share of the publication channels belonging to your field in your panel that you have personal experience of?" Personal experience appears to cover a smaller share of the journals in the SSH panels and among current panellists than in theSTEM panels and among
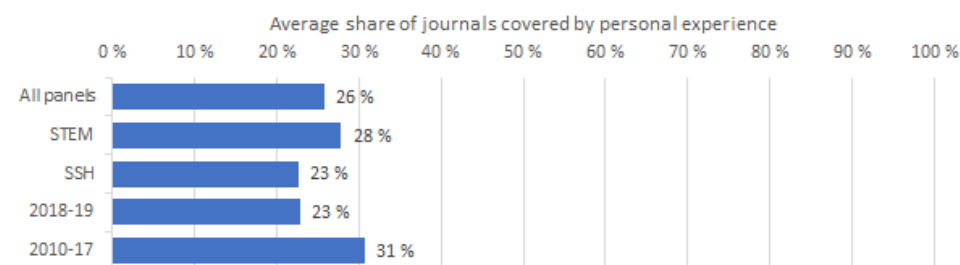
previous panellists. Number of responses: 166. Source: Online survey to Publication Forum panellists.

Figure 17. Answers to the question "Roughly how large is the share of the publication channels belonging to your field in your panel that you have personal experience of?" Panellists' personal experience covers on average 26 % of the journals of their field in the panel's list. Number of responses: 166. Source: Online survey to Publication Forum panellists.

11. Role of information supporting evaluation

In support of the evaluation work, the panels have information on WoS, Scopus, ERIHPlus and DOAJ indexing, self-archiving policy (Sherpa / Romeo), JIF, SNIP and SJR citation indicators, Norwegian and Danish levels, suggestions from scientific community, and panel members' views.

Key findings:

- Respondents value most highly the expert opinion of the other panellists, of their own, and of the research community in evaluating the quality of publication channels (Figures 18 and 19).
- Norwegian and Danish level ratings are considered as important as citation-based journal metrics, of which JIF and SNIP are more important than SJR

Questions:

- Estimate on a scale of 1-5 the importance of different information for the evaluation of quality of the publication channel (1 = not important - 5 = very important)? Please choose the appropriate response for each item:
  - Publisher
  - Indexing in WoS
  - Indexing in Scopus
  - Indexing in ERIHPlus
  - Indexing in DOAJ
  - Self-archiving policy (Sherpa/Romeo)
  - JIF indicator
  - SJR indicator
  - SNIP indicator
  - Norwegian level
  - Danish level
  - Suggestions from the research community
  - Views of other panel members
  - Your own views
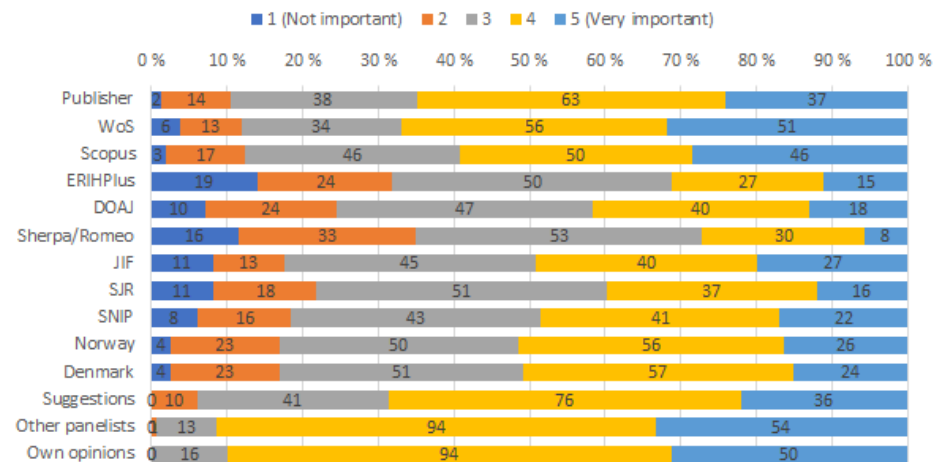
Figure 18. Answers to the question "Estimate on a scale of 1-5 the importance of different informetrics. Number of responses: 166. Source: Online survey to Publication Forum panellists.
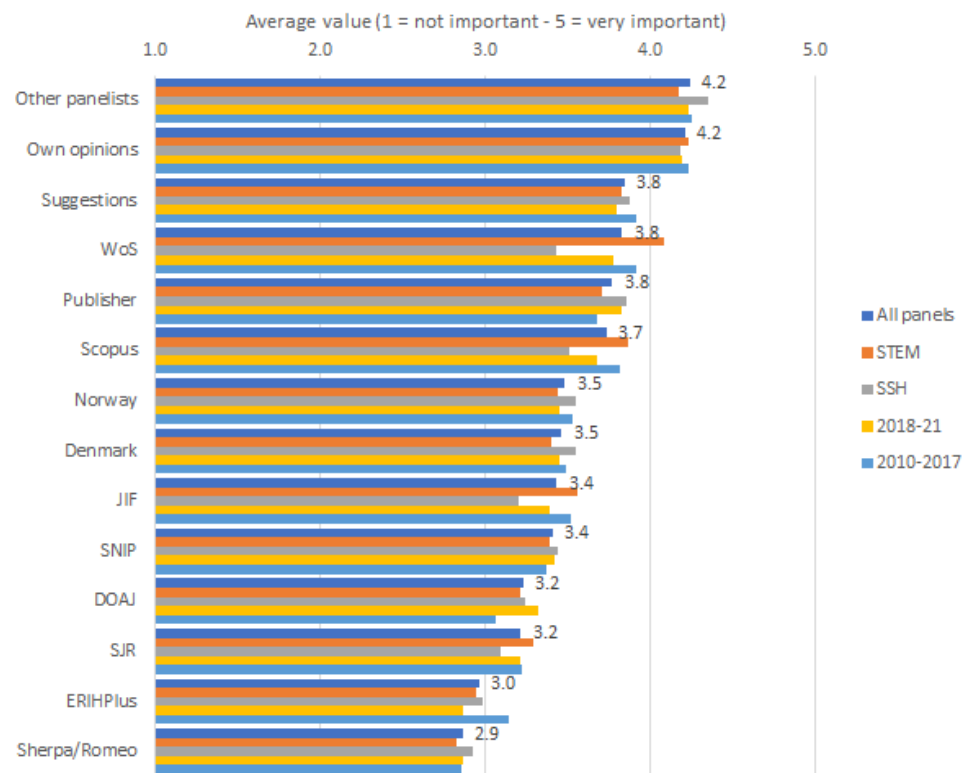
Figure 19. Average values to the question "Estimate on a scale of 1-5 the importance of different information for the evaluation of quality of the publication channel?". Respondents value most highly the expert opinion of the other panellists, of their own, and of the research community. Norwegian and Danish level ratings are considered as important as citation-based journal metrics. Number of responses: 166. Source: Online survey to Publication Forum panellists.

12. Importance of Finnish publication volume

Classification of the publication channels is primarily based on their quality, impact and appreciation in the international research community.

Key findings:

- While only 2 % of the respondents answered (5) that the Finnish use of the channel is a very important consideration, 22 % answered (4) that it is important (Figure 20).
- Most panels in both STEM and SSH fields have respondents who assess the importance of Finnish use very differently, either as an important or not important consideration.

Questions:

- Estimate on a scale of 1-5 how important the panel considered in choosing channels to levels 2 and 3 if the channel is much or little used by the Finnish researchers? (1 = not important consideration - 5 = very important consideration)
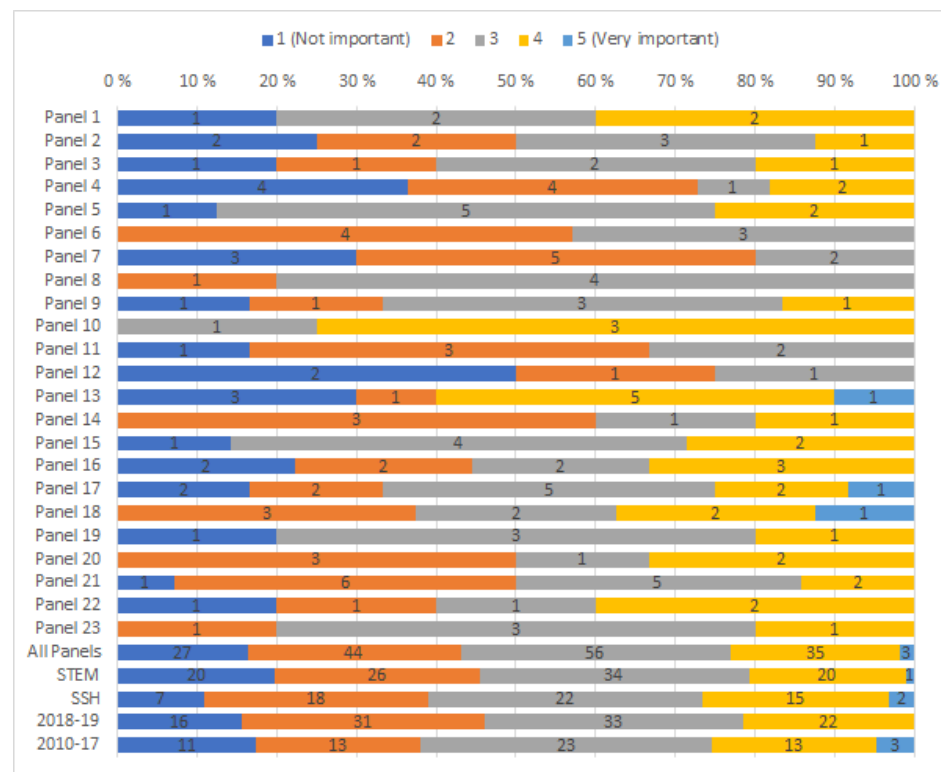
Figure 20. Answers to the question "Estimate on a scale of 1-5 how important the panel considered in choosing channels to levels 2 and 3 if the channel is much or little used by the Finnish researchers?" While 24 % of the respondents answered that the Finnish use of the channel is an important consideration, 43 % answered that it is not important. Number of responses: 166. Source: Online survey to Publication Forum panellists.

13. Distribution of journals/series between panels

Journals are divided between panels based on field but part of the publication channels are important from the perspective of many panels.

Key findings:

- Panel's list covers on average 68 % of the journals that the respondent considers relevant for his or her field of expertise, ranging typically between 50 % and 90 % (Figures 21 and 22).

Questions:

- Roughly how large a share of journals that are relevant from the perspective of your expertise are covered by your panel's list of journals? Please choose only one of the following:
    - 100 % 100 %
    - 90 % 90 %
    - 80 % 80 %
    - 70 % 70 %
    - 60 % 60 %
    - 50 % 50 %
    - 40 % 40 %
    - 30 % 30 %
    - 20 % 20 %
    - 10 % 10 %
    - 0 % 0 %
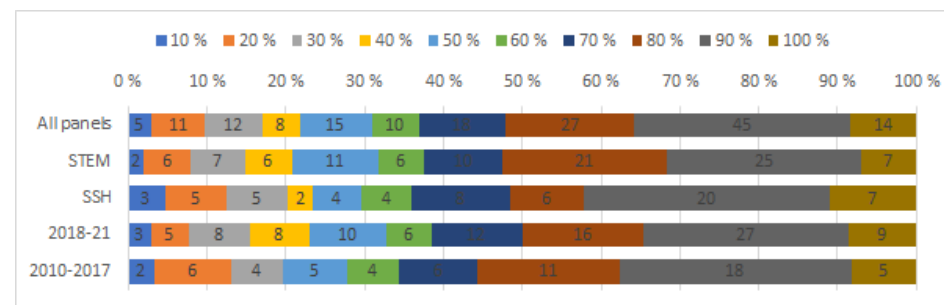
Figure 21. Answers to the question "Roughly how large a share of journals that are relevant from the perspective of your expertise are covered by your panel's list of journals?" Panel's list covers on average 68 % of the journals that the respondent considers relevant for his or her field of expertise. Number of responses: 166. Source: Online survey to Publication Forum panellists.
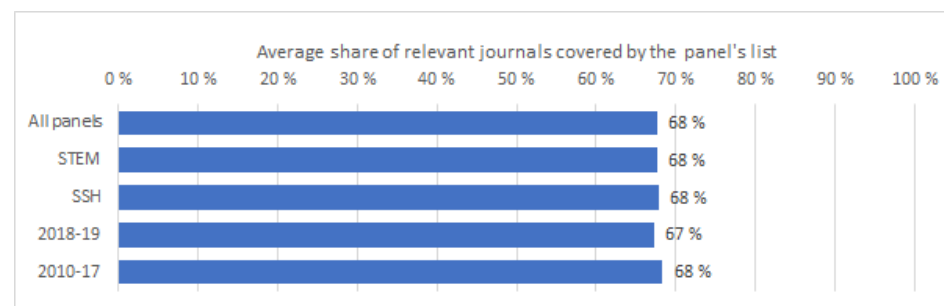
Figure 22. Answers to the question "Roughly how large a share of journals that are relevant from the perspective of your expertise are covered by your panel's list of journals?" Panel's list covers on average 68 % of the journals that the respondent considers relevant for his or her field of expertise. Number of responses: 166. Source: Online survey to Publication Forum panellists.

14. Relation to esteem of the research community

The publication forum classification is intended to reflect the appreciation of the scientific community.

Key findings:

- 68 % of respondents (and 73 % from the current term 2018-2019) answered (4-5) that the panel's rating matches well or very well with the appreciation of the scientific community in the subject area (Figure 23).
- Current panellists (term 2018-2021) consider that there is a better match between the ratings and esteem of the research community than the panellists from the previous terms (2010-2017).
- A larger share of the panellists from the SSH fields consider that there is a good match between the ratings and the appreciation of the research community than panellists from the STEM fields.

Questions:

- On a scale from 1 to 5, estimate how well the panel's rating matches with the appreciation of the scientific community in the subject area? (1 = Poorly - 5 = very well)
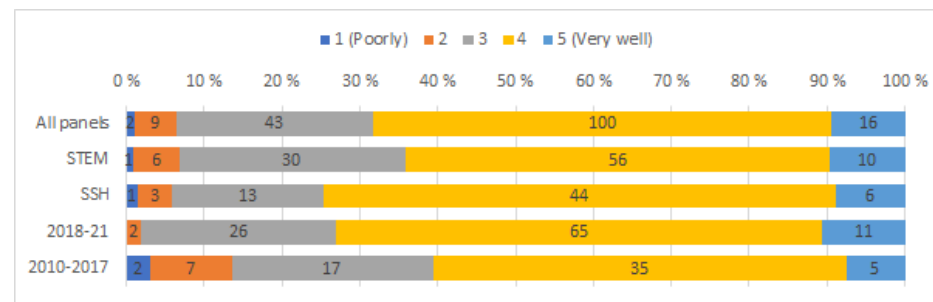
Figure 23. Answers to the question "On a scale from 1 to 5, estimate how well the panel's rating matches with the appreciation of the scientific community in the subject area?" 68 % of respondents answered that the panel's rating matches well or very well with the appreciation of the scientific community in the subject area. Number of responses: 166. Source: Online survey to Publication Forum panellists.

15. Publication language

Channels publishing in English, in Finnish and Swedish, and other languages (eg German, Spanish, French, Russian, etc.) are accepted by the same criteria in level 1, but the importance of international (often in English language) channels is emphasized in Level 2 and Level 3, with the exception of social science and humanities panels having level 2 and 3 also include channels publishing in the national and other languages.

Key findings:

- 34 % of the respondents answered (4-5) that nominating Finnish and Swedish language channels to JUFO levels 2-3 is important or very important (Figure 24).
- 29 % of the respondents answered (4-5) that nominating channels publishing in languages other than English, Finnish or Swedish to JUFO levels 2-3 is important or very important (Figure 25).
- Smaller share of the panellists from the current term (2018-2021) than the previous terms (2010-2017) consider it important to nominate other than English language channels at JUFO levels 2-3.
- Panellists from the SSH fields consider language diversity at JUFO levels 2-3 much more important than STEM panellists.

Questions:

- On a scale of 1-5, evaluate how important you consider the acceptance of channels publishing in higher levels 2 and 3? (1 = not important - 5 = very important)? Please choose the appropriate response for each item:
  - Acceptance of Finnish and Swedish-language channels in levels 2 and 3
  - Acceptance of other than English, Finnish and Swedish-language channels in levels 2 and 3
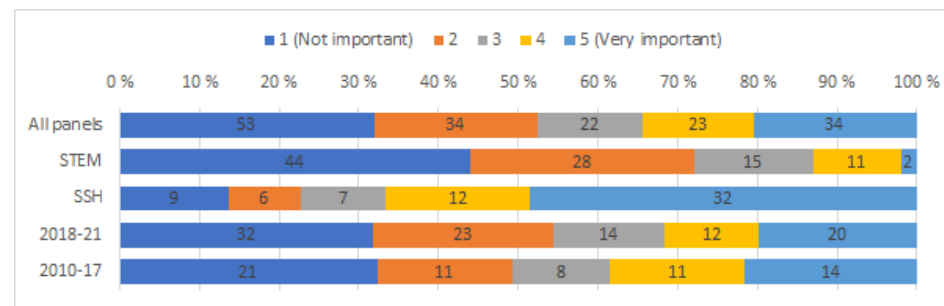
Figure 24. Answers to question: "How important do you consider the acceptance of Finnish and Swedish-language channels in levels 2 and 3?" 34 % of the respondents answered that nominating Finnish and Swedish language channels to JUFO levels 2-3 is important or very important. Number of responses: 166. Source: Online survey to Publication Forum panellists.
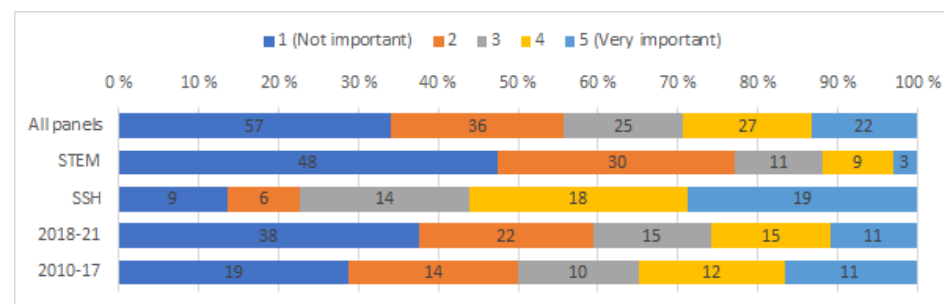
Figure 25. Answers to question: "How important do you consider the acceptance of other than English, Finnish and Swedish-language channels in levels 2 and 3?" 29 % of the respondents answered that nominating channels publishing in languages other than English, Finnish or Swedish to JUFO levels 2-3 is important or very important. Number of responses: 166. Source: Online survey to Publication Forum panellists.

16. Open Access

Open access and traditional publishing channels are accepted with the same criteria in level 1, and selection in level 2 and 3 can favor a channel that allows open access if the publishing channels are of equal quality.

Key findings:

- 44-51 % of the respondents answered (4-5) that nominating gold and green OA channels to JUFO levels 2-3 is important or very important (Figures 26 and 27).
- Only 34-21 % of the respondents answered (4-5) that nominating hybrid or closed OA channels to JUFO levels 2-3 is important or very important (Figures 28 and 29).
- Current panellists (2018-2021) and panellists from SSH fields are more often favourable to nominating OA channels to JUFO levels 2-3 that panellists from the previous terms (2010-2017) and from STEm fields.

Questions:

- On a scale of 1-5, evaluate how important you consider the acceptance of channels permitting different kinds of open access to higher levels 2 and 3 (1 = not important - 5 = very important)?
  - Acceptance of gold open access channels in levels 2 and 3
  - Acceptance channels permitting self-archiving in levels 2 and 3
  - Acceptance of partially open hybrid channels in levels 2 and 3
  - Acceptance of channels preventing open access in levels 2 and 3
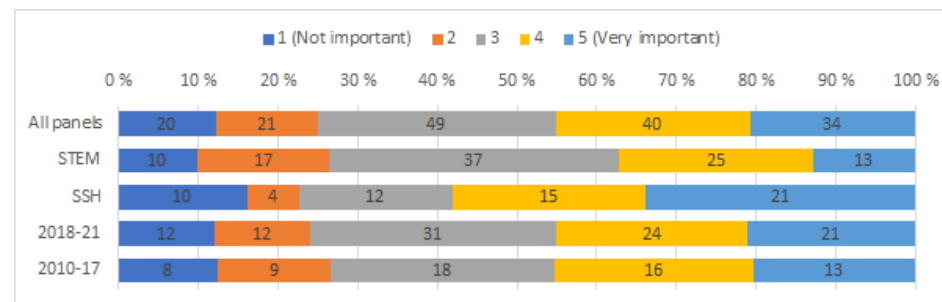
Figure 26. Answers to question: "How important do you consider the acceptance of gold open access channels in levels 2 and 3?". 44 % of the respondents answered that nominating gold OA channels to JUFO levels 2-3 is important or very important. Number of responses: 166. Source: Online survey to Publication Forum panellists.
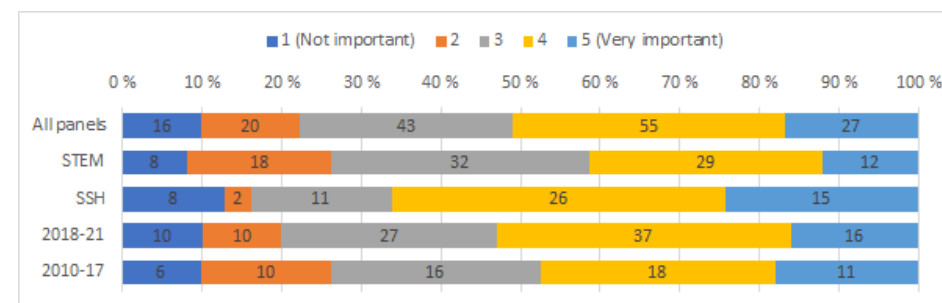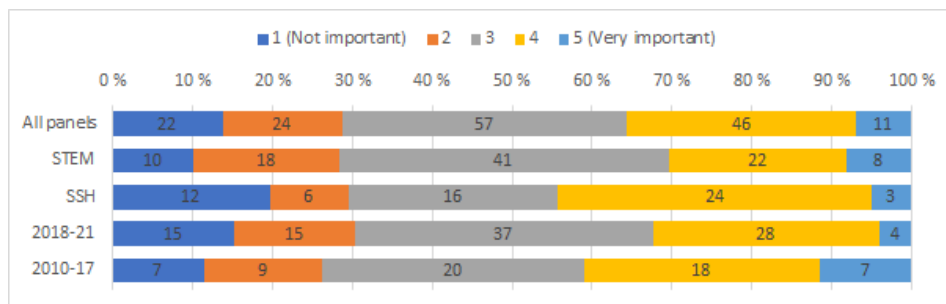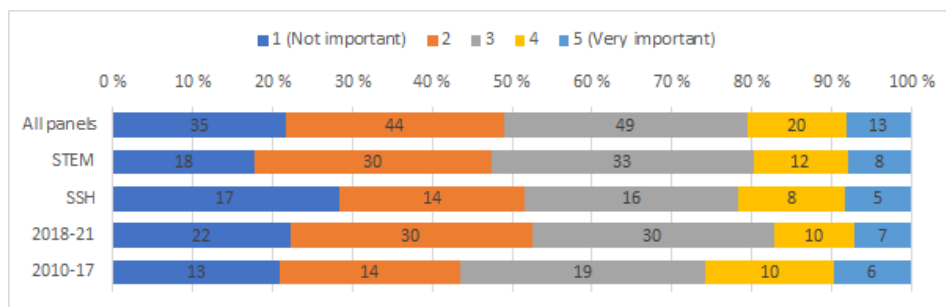

Figure 27. Answers to question: "How important do you consider the acceptance of channels permitting self-archiving in levels 2 and 3?" 51 % of the respondents answered that nominating green OA channels to JUFO levels 2-3 is important or very important. Number of responses: 166. Source: Online survey to Publication Forum panellists.

Figure 28. Answers to question: "How important do you consider the acceptance of partially open hybrid channels in levels 2 and 3?" 34% of the respondents answered that nominating hybrid channels to JUFO levels 2-3 is important or very important. Number of responses: 166. Source: Online survey to Publication Forum panellists.

Figure 29. Answers to question: "How important do you consider the acceptance of channels preventing open access in levels 2 and 3?". 21% of the respondents answered that nominating closed channels to JUFO levels 2-3 is important or very important. Number of responses: 166. Source: Online survey to Publication Forum panellists.

17. JUFO level quotas

Since 2014, level ratings are balanced between different disciplines using quotas based on publication volumes. In each panel, the total publishing volume of the level 2 journals may be up to 20% of the total volume of publication series on Levels 1-3, of which a maximum of 5% for Level 3. The higher the number of articles published each year in the publication series, the more it will spend on the quota of level 2 and 3 of the panel.

Key findings:

- 63 % of the respondents answered that the publication volume share of JUFO level 2 should be increased, the most frequently proposed shares being 25 % and 30 % (average 26 %) (Figures 30 and 31).
- 67 % of the respondents answered that the publication volume share of JUFO level 3 should either be reduced to 0 % or be increased, the most frequently proposed share being 10 % (average 8 %) (Figures 32 and 33).
- 62 % of the respondents (and 72 % from STEM fields) answered (4-5) that using publication volume as basis on the level quotas increases the difficulty of evaluation much or very much (Figure 34).
- 50 % of the respondents (and 61 % from STEM fields) answered that the effect of publication volume should be decreased (Figure 35).

Questions:

- What is the appropriate share of publishing volume in Level 2 (Only numbers may be entered in this field)?
- What is the appropriate share of publishing volume in Level 3 (Only numbers may be entered in this field)?
- Estimate on a scale 1-5, how much does this make the panel's evaluation work more difficult (1 = little - 5 = very much)?
- Should the volume of publishing be reduced or increased in the calculation

of quotas? Please choose only one of the following:
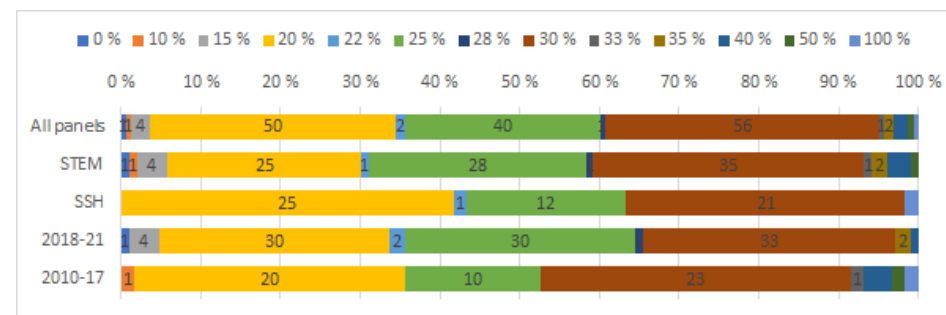
- Decrease
- As now
- Increase

Figure 30. Answers to question: "What is the appropriate share of publishing volume in Level 2?" 63 % of the respondents answered that the publication volume share of JUFO level 2 should be increased, the most frequently proposed shares being 25 % and 30 %. Number of responses: 166. Source: Online survey to Publication Forum panellists.
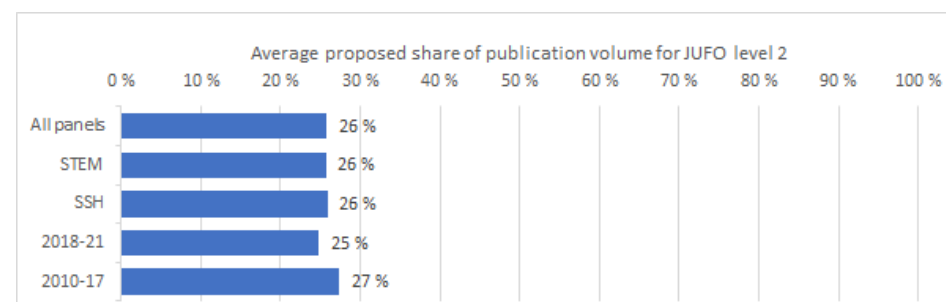

Figure 31. Average values to question: "What is the appropriate share of publishing volume in Level 2?" The average proposed share of publication volume for JUFO level 2 was 26 %. Number of responses: 166. Source: Online survey to Publication Forum panellists.
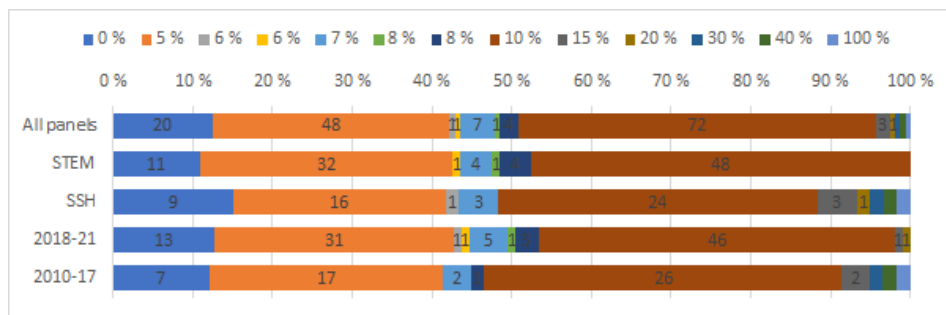
Figure 32. Answers to question: "What is the appropriate share of publishing volume in Level 3?" Most of the respondents answered that the publication volume share of JUFO level 3 should be increased to 10 %. Number of responses: 166. Source: Online survey to Publication Forum panellists.
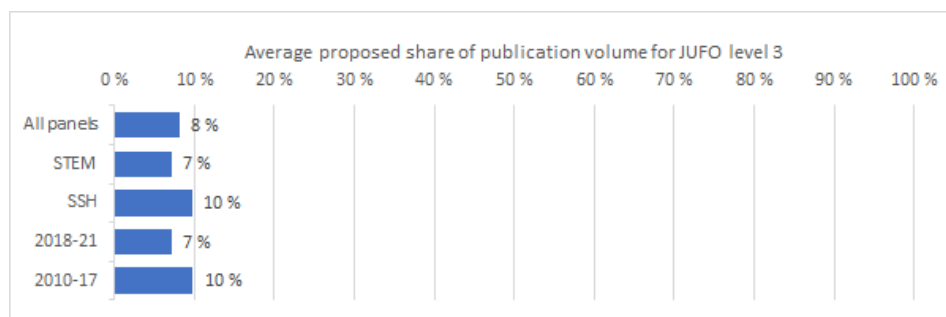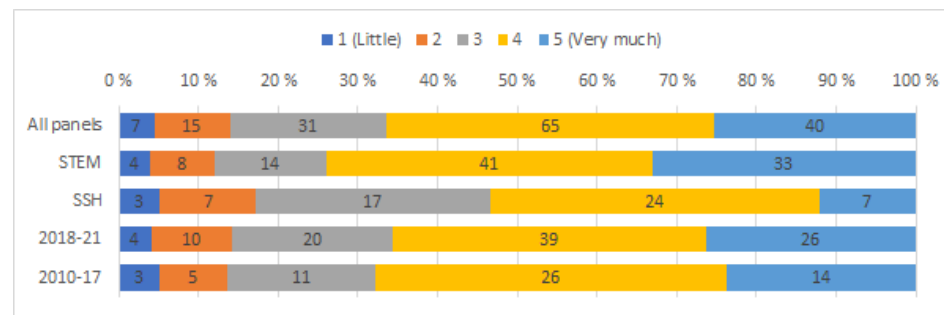

Figure 34. Answers to question: "Estimate on a scale 1-5, how much does this make the panel's evaluation work more difficult?". 62 % of the respondents answered that using publication volume as basis on the level quotas increases the difficulty of evaluation work much or very much. Number of responses: 166. Source: Online survey to Publication Forum panellists.
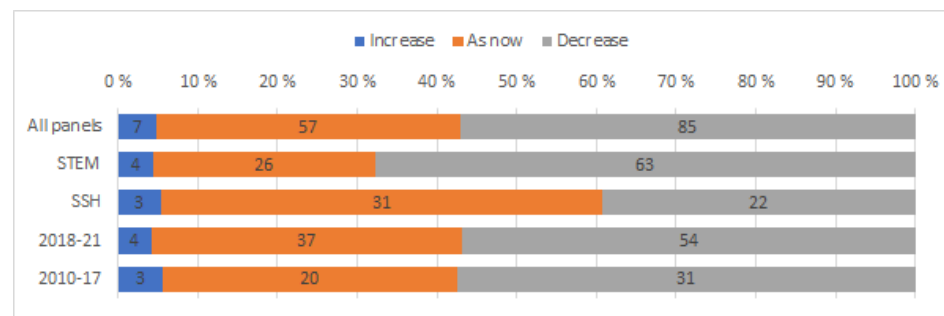

Figure 33. Average values to question: "What is the appropriate share of publishing volume in Level 3?". The average proposed share of publication volume for JUFO level 3 was 8 %. Number of responses: 166. Source: Online survey to Publication Forum panellists.

Figure 35. Answers to question: "Should the effect of volume of publishing be reduced or increased in the calculation of quotas?". 50 % of the respondents answered that the effect of publication volume should be decreased. Number of responses: 166. Source: Online survey to Publication Forum panellists.

18. Equality between fields

The task of the panels is equal treatment of different research fields.

Key findings:

- Only 39 % of the respondents answered (4-5) that the panel's classification treats the different specialties or subfields covered by the panel fairly or very equally (Figure 36).
- A larger share of the current panellists (2018-2021) than the panellists from previous terms (2010-2017) consider that the rating treats different subfields fairly or very equally (47 % vs. 26 %).

Questions:

- Estimate on a scale from 1 to 5, how equally does the panel's classification treat the different specialties or subfields covered by the panel (1 = not equally - 5 = very equally)?
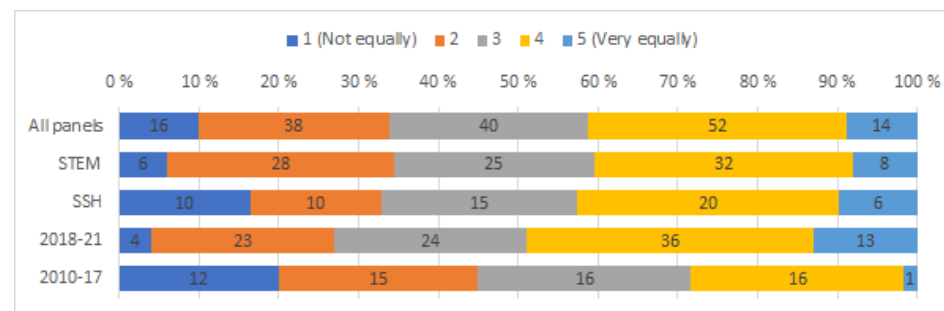

Figure 36. Answers to question: "How equally does the panel's classification treat the different specialties or subfields covered by the panel?" 39 % of the respondents answered that the panel's classification treats the different specialties or subfields covered by the panel fairly or very equally. Number of responses: 166. Source: Online survey to Publication Forum panellists.

19. Satisfaction of evaluation work

Key findings:

- The vast majority of respondents indicated a high or very high level of satisfaction with the work of secretariat (94 %) and their own panel (84 %), as well as with the JUFO-portal (72 %) and the steering-group (68 %) (Figures 37 and 38).
- 75 % of the respondents indicated a fairly or very high experience of usefulness of the work in the expert panel for their own experience and for the research community, 67 % for the research evaluation, and less than 50 % for research funding and steering (Figures 39 and 40).
- Overall, current panellists (term 2018-2021) consider the panel work more satisfying and useful than previous panellists (2010-2017).

Questions:
- If you look at the activities of the Publication Forum as a whole, estimate on a scale of 1-5 how satisfied you are with panels, technical aids and the Federation of Finnish Learned Societies (1 = unsatisfied - 5 = satisfied)? Please choose the appropriate response for each item:
    - Own panel's operation
    - Other panel's operation
    - JUFO-portal's operation
    - Secretariat's operation
    - Steering-group's operation
- On a scale from 1 to 5, how useful is your work in the Publication Forum expert panel (1 = not very useful - 5 = very useful)? Please choose the appropriate response for each item:
    - For your own experience
    - For the research community
    - For the research evaluation
    - For funding of research
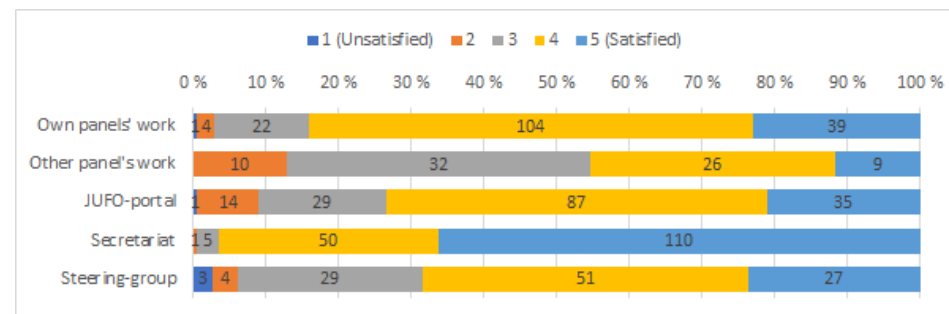   - For steering of research

Figure 37. Answers to question: "How satisfied you are with panels, technical aids and the Federation of Finnish Learned Societies?". The vast majority of respondents indicated a high or very high level of satisfaction with the work of secretariat and their own pane, as well as with the JUFO-portal and the steering-group. Number of responses: 166. Source: Online survey to Publication Forum panellists.
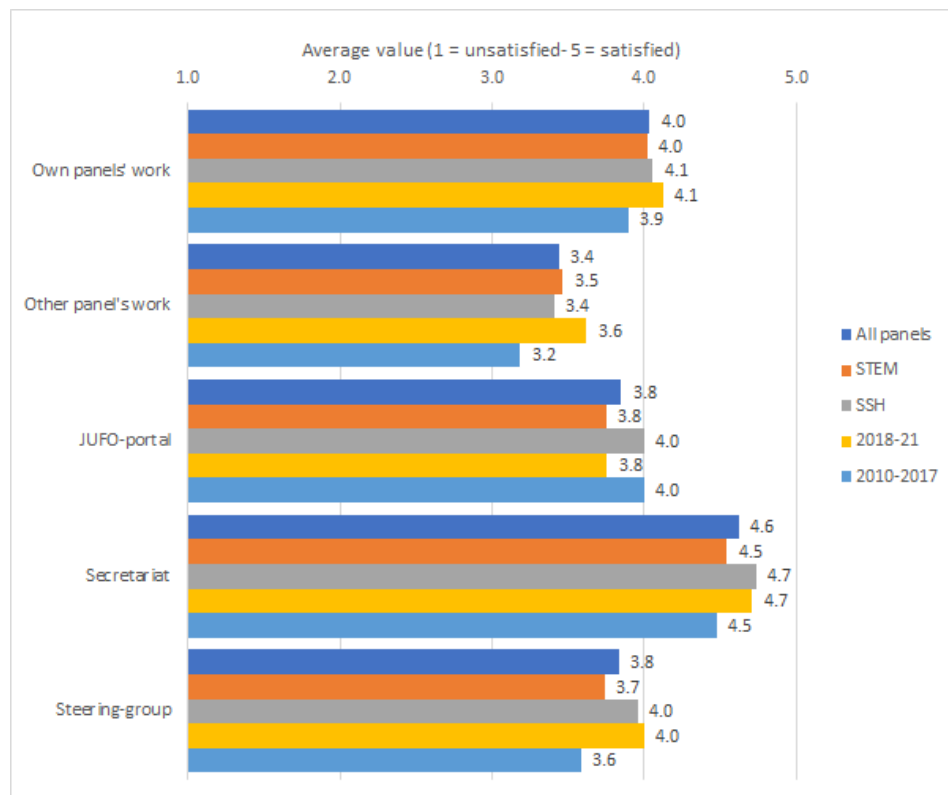
Figure 38. Average values to question: "How satisfied you are with panels, technical aids and the Federation of Finnish Learned Societies?". The vast majority of respondents indicated a high or very high level of satisfaction with the work of secretariat and their own pane, as well as with the JUFO-portal and the steering-group. Number of responses: 166. Source: Online survey to Publication Forum panellists.
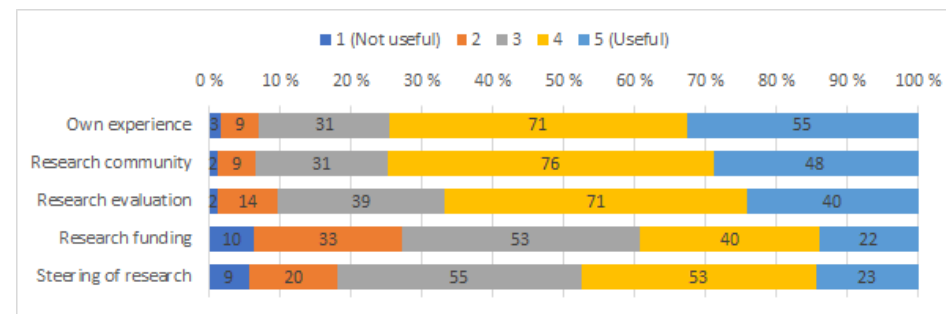

Figure 39. Answers to question: "How useful is your work in the Publication Forum expert panel?" 75 % of the respondents indicated a fairly or very high experience of usefulness of the work in the expert panel for their own experience and for the research community. Number of responses: 166. Source: Online survey to Publication Forum panellists.
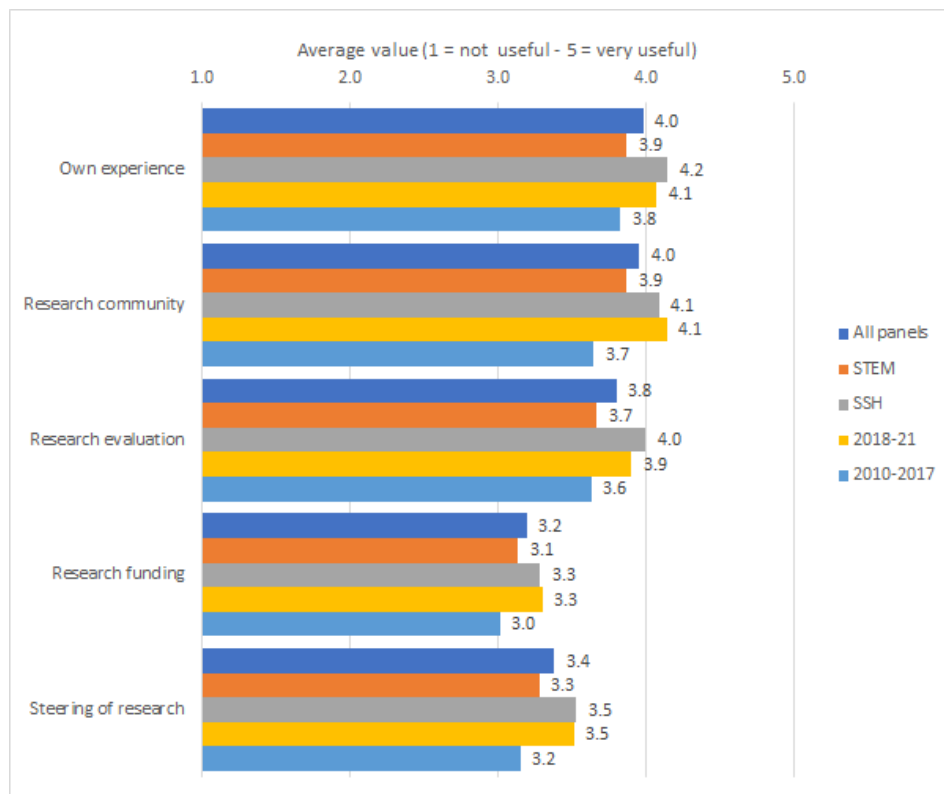
Figure 40. Average values for question: "How useful is your work in the Publication Forum expert panel?". 75 % of the respondents indicated a fairly or very high experience of usefulness of the work in the expert panel for their own experience and for the research community. Number of responses: 166. Source: Online survey to Publication Forum panellists.

20. Give feedback or suggestion for development concerning the Publication Forum