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Abstract

Uppsala University Annual Bibliometric Monitoring produces statistics on publication volume, publishing level, citation impact, collaboration (in terms of co-publishing) and open access. The aggregation level is primarily department, which means that it is primarily the departments of Uppsala University that are the units of analysis in the monitoring. Two main data sources are used: the local publication database of Uppsala University, DiVA, and the in-house version of the Web of Science database available at the Centre for Science and Technology Studies at Leiden University, the Netherlands. The considered publication period is 2014-2022. The results are presented in graphs or in tables, and in the next to last section, the results are briefly summarized. Regarding the domain Humanities and Social Sciences, and the indicator proportion of publication fractions at level 2 (in the Norwegian model), the department *Philosophy* has an increase of about 18 percentage units from the publication period 2015-2017 to the period 2020-2022. *Peace and Conflict Studies* has very high figures on all citation indicators with respect to the whole publication period. The highest values on the citation indicator PP(top 10%), with respect to the domain Medicine and Pharmacy and the last considered publication period, are observed for the three departments *Medical Biochemistry and Microbiology*, *Immunology*, *Genetics and Pathology* and *Medicinal Chemistry*. For the domain Science and Technology, the four departments *Cell and Molecular Biology*, *Chemistry – BMC*, *Ecology and Genetics* and *Organismal Biology* all have high values on the citation indicators with respect to the whole publication period. For the last considered period, *Ecology and Genetics*, *Organismal Biology* and *Chemistry – BMC* have the three highest PP(top 10%) values.

1 Introduction

Uppsala University (UU) *Annual Bibliometric Monitoring* (ABM) produces statistics on publication volume, publishing level, citation impact, collaboration (in terms of co-publishing) and open access (OA). The aggregation level is primarily department, which means that it is primarily the departments of UU that are the units of analysis in ABM. However, the first subsection of the results section below reports outcomes for UU as a whole.

Values of several bibliometric indicators are obtained for the departments included in ABM. Indicator values are obtained by publication year. However, 3-year moving averages are generally applied.

In “Quality and Renewal 2017” (“Kvalitet och förnyelse 2017”) (Malmberg et al., 2017), the peer assessments were complemented with a bibliometric report. One conclusion of the exercise was that an annual bibliometric report was desirable. The ABMs are a response to this conclusion and present extensive bibliometric statistics with regard to the UU departments.

UU has six development goals to renew education and research.¹ For goal 2, “Develop research excellence”, the citation impact indicator *proportion of frequently cited publications (top 10%)*, an indicator described in Section 2.2, is particularly relevant among the indicators included in ABM. The two collaboration indicators of ABM (Section 2.3)–*proportion of international collaborative publications* and *proportion of publications with industry*–are both relevant for goals 3 and 6, “Strengthen transdisciplinary and challenge-driven research” and “Develop collaboration”, respectively.

The remainder of this report is structured as follows. Section 2 treats the data and methods of ABM. The results of ABM are reported in Section 3, whereas the results are briefly summarized in Section 4. Concluding remarks are given in Section 5.

2 Data and methods

Two main data sources are used in ABM: the local publication database of UU, DiVA, and the in-house version of the Web of Science (WoS) database available at the Centre for Science and Technology Studies (CWTS) at Leiden University, the Netherlands. The latter database is accessed via CWTS Monitor, a tool for bibliometric analysis of WoS publications and provided by CWTS. We used version 2023/2 in ABM 2023. DiVA data, or more precisely DiVA data as it appears in GLIS

¹ <https://www.uu.se/en/about-uu/vision-goals-and-strategies/mission-goals-and-strategies/>

(*Generellt Lednings Informations System*), is used for the analysis according to the Norwegian model, and for obtaining the publication volume tables of the results section, whereas CWTS Monitor is used for the analysis of citation impact and collaboration. For the OA analysis, we use the same DiVA/GLIS data used for the Norwegian model analysis, combined with OA data from Unpaywall, DOAJ, OpenAPC and Sherpa Romeo.

In the Norwegian model, as well as in the citation analyses in ABM, author fractionalization is used. An author of a publication is assigned $1/n$ of the publication, where n is the number of authors of the publication. The fraction of the publication assigned to a given UU department is the sum of the author fractions with regard to the authors affiliated to the department. Note, though, that if an author is affiliated to m ($m \geq 2$) UU departments in a publication, the author contributes with $1/(n \times m)$ author fraction to all m departments (the author fraction an UU department has of a publication is more formally defined in Appendix 1).

In the citation analyses and in the collaboration analyses of ABM, only the WoS publication types “Article” and “Review” are taken into account. Further, in these two types of analyses, only core publications are used. Core publications are publications in international scientific journals in fields that are suitable for citation analysis.² In the citation analyses, author self-citations are excluded. A citation is counted as an author self-citation if the citing and the cited publication have at least one common author name.

For OA, we use full counts at the department level: each affiliated department is assigned the publication. OA is measured by defining the open access status for each publication and counting the number of publications affiliated to each department.

We use the following condition for department inclusion in the Norwegian model, the collaboration and the OA analyses:

- (a) The researchers of the department have not their main affiliation to another unit.

Information on (a) was obtained from the offices for the three scientific domains of UU. These three domains are Humanities and Social Sciences (Humsam), Medicine and Pharmacy (Medfarm), and Science and Technology (Teknat).

With regard to the citation analyses of ABM, the following two inclusion conditions are applied:

- (a) the researchers of the department have not their main affiliation to another unit, and
- (b) the department has at least 40 (core) publications (of the types “Article” and “Review”) in the period 2014-2021.

For each table below that reports citation analysis results, the expression “null” in a cell indicates that condition (a), but not condition (b), is satisfied by the department corresponding to the row of the cell.

2.1 The Norwegian Model

The Norwegian model considers publishing volume and publishing level. For level, the model does not use citations. Instead, the model takes into account the extent to which publications from a unit of analysis are published in publishing channels with large prestige. The channels that are considered in the model are journals, publishers and series. A large number of channels have been assessed in Norway by subject experts and assigned to one of three levels: level 0 (non-scientific channel), level 1 (scientific channel), and level 2 (scientific channel with extra-large prestige).

The Norwegian model comprises three publication types: article in journal or series, article in anthology and monograph. Conference papers are taken into account. If the host publication of a conference paper belongs to a series, the paper is classified as article in journal or series, otherwise the paper is classified as article in anthology. The weight of a publication is determined by its type and by the level of its channel. How publications are weighted is reported in Table 1.

² For more on core journals, see the CWTS Leiden Ranking page <https://www.leidenranking.com/information/indicators>.

Table 1. The weights of the Norwegian model as a function of publication type and publishing level.

Publication type	Level 1	Level 2
Article in journal or series	1	3
Article in anthology	0,7	1
Monograph	5	8

The publishing channels at level 2 in a given research field should publish a certain proportion (20%) of the publications of the field. By this rule, comparisons across fields are fairer, compared to if a certain number of channels, constant across fields, had been stipulated for level 2. The reason for this is that the access to level 2 channels becomes more equal across fields. Note that the proportion publications at level 2 for a given unit of analysis can be seen as a quality indicator (Schneider, 2009).

Some publications are excluded in analyses according to the Norwegian model, for instance:

- Letter to the editor
- Working reports
- Publications where the author has editorship
- Popular scientific publications

Each unit of analysis is assigned a publication score, a weighted expression for publishing volume and publishing level. The scores are obtained by multiplying author fractions by weights. For example, the publication score for a department, for a given publication year, with respect to articles published in level 2 journals is equal to the sum of the department author fractions over the articles (published in the year) multiplied by 3, the weight for an article published in a level 2 journal (Table 1).

In ABM, each considered UU department is assigned a publication score for each considered publication year. In the application of the Norwegian model, the publication period is 2015-2022.

2.2 Field Normalized Citation Impact

An important principle in evaluative bibliometrics is to compare like with like. It is a fact that citation volumes are not equal across research fields. For instance, the volumes are considerably larger in biomedicine than in pure mathematics. This is due to different citation practices in the two fields. If publications from fields as these two should be compared with regard to citation impact, some form of normalization of raw citation scores should be performed. In ABM, all used citation impact indicators are *field normalized*.

The publication period used for the citation analyses is 2014-2021. The end publication year in the version of CWTS Monitor used is 2021. Further, a later end year than 2021 would not be proper due to an inappropriately short citation window.

ABM makes use of two kinds of field normalized citation indicators: publication-level indicators and journal-level indicators. In the next section, we treat the former ones, whereas the latter ones are treated in the section after the next section.

2.2.1 Publication-level indicators

Two publication-level indicators are used, namely *mean normalized number of citations per publication* (MNCS) and *proportion of frequently cited publications (top 10%)* (PP(top 10%)). These two indicators, which complements each other, are used, for instance, in the CWTS Leiden Ranking 2023.³ For both MNCS and PP(top 10%), and for the two journal-level indicators described below, a subject classification of publications is used for normalization purposes. The classification is generated by application of an advanced clustering methodology, in which a publication-publication relatedness measure based on direct citations between publications is utilized (Waltman & van Eck, 2012). The

³ <http://www.leidenranking.com/>

classification, which contains about 4,000 classes, is such that each publication belongs to exactly one class.⁴

Regarding MNCS, and for each publication from a given department, the citation score of the publication is divided by the mean citation score across the publications, published in the same year as the publication, in the class to which the publication belongs. The resulting value is a (field) normalized citation score (NCS) for the publication. The MNCS for the department is then obtained by dividing the weighted sum of NCS values over the publications from the department—where the weight of a publication consists of the author fraction the department has of the publication—by the sum of the department author fractions over the publications. If the department has a MNCS of, say, 1.2, the department performs 20% above world average ($= 1$).

For PP(top 10%), and publication i from the department, the same class in the classification is used as in the calculation of the NCS for i . The citation score distribution for the class, with respect to publications published the same year as i , is obtained, and the extent to which i belongs to the 10% most frequently cited publications is determined. The result for i is a value in the interval $[0, 1]$, say (top 10%) $_i$.⁵ PP(top 10%) for the department is then obtained by dividing the weighted sum of (top 10%) values over the publications from the department—where the weight of a publication consists of the author fraction the department has of the publication—by the sum of the department author fractions over the publications (cf. the calculation of MNCS). If the department has a PP(top 10%) value of, say, 8, the department performs 20% below the world average ($= 10$).

2.2.2 Journal-level indicators

The two publication-level citation indicators are complemented by two corresponding journal-level citation indicators, namely *mean normalized journal impact score per publication* (MNJS) and *mean journal proportion of top 10% publications* (MJPP(top 10%)).

For MNJS, each journal is first assigned an impact score, NJS, for each of the considered publication years. NJS, for a given year, is equal to the mean across the NCSs of the publications in the journal published that year. Thus, NJS is a field normalized variant of the well-known Journal Impact Factor, values of which is available in Journal Citation Reports (provided by Clarivate Analytics). The latter indicator is not field normalized, however. Now, for a department and each publication from the department, the department author fraction of the publication is multiplied by the NJS of the journal of the publication with respect to the publication year of the publication. These operations yield a weighted sum over the publications from the department, and this sum is divided by the sum of the department author fractions over the publications. The result of the division is the MNJS for the department. Like MNCS, the world average for its journal-level counterpart, MNJS, is equal to 1.

The MJPP(top 10%) indicator is calculated as follows. For each combination of a journal, a class, and a publication year, the proportion of the publications in that journal, class, and year that belong (to a degree in the interval $[0, 1]$) to the 10% most frequently cited publications in that class and year is determined. This yields a PP(top 10%) value for each combination of a journal, a class, and a year. This value is assigned to all publications in that journal, class, and year. In this way, each publication obtains a JPP(top 10%) value. The MJPP(top 10%) value of a department is obtained dividing the weighted sum of JPP(top 10%) values over the publications from the department—where the weight of a publication consists of the author fraction the department has of the publication—by the sum of the department author fractions over the publications.

⁴ The traditional approach to field normalization typically uses the journal subject categories in WoS. However, one problem with the traditional approach is that the subfields of a certain field, where the fields are defined at a given level of granularity, might differ substantially from each other in terms of citation volume (e.g., van Eck et al., 2013). Moreover, it is clearly more reasonable to group the publications themselves into subject classes than to group the publications into such classes based on subject class membership of their journals.

⁵ The approach to assign fractions of publications to the (for instance) 10% most frequently cited publications is described and discussed by Waltman and Schreiber (2013). The approach has the property to produce exactly 10% top 10% publications. In Appendix 1, we show how the extent to which publication i belongs to the 10% most frequently cited publications is calculated.

2.3 Collaboration

ABM uses two collaboration indicators: *proportion of international collaborative publications* (PP(int collab)) and *proportion of publications with industry* (PP(industry)). PP(int collab) for a department is the proportion of its publications that have been co-authored with two or more countries, whereas PP(industry) for a department is the proportion of its publications that have been co-authored with one or more industrial organizations. All private sector for profit business enterprises, covering all manufacturing and services sectors, are regarded as industrial organizations.

Here, and normally, full counts (and not fractional counts) are used for collaboration analysis. This means, taken international collaboration as an example, that if an UU department publication has at least one foreign address, relative to Sweden, the department is assigned one international collaborative publication, regardless of the author fraction the department has of the publication. If fractional counts are used, collaboration might be underestimated. However, publications with many organizations, like some of the publications in certain subfields of physics, do not indicate, to any larger extent, collaboration between the involved organizations. Such publications are included in the analysis.

For the collaboration part of ABM, the publication period is 2014-2021.

2.4 Open Access

Explained in a simple way, OA is the concept of publications distributed online, free of cost or other access barriers to the reader. In the research policy bill “Forskning, frihet, framtid” (Prop. 2020/21:60), the Government’s national direction towards open science states that scientific publications, which are the result of research financed with public funds, should be published using immediate OA, with effect from year 2021. It is a shared responsibility for all actors in the research system that the direction towards immediate OA is followed and achieved. Large national and international funders, such as the Swedish Research Council and Horizon 2020 (European Commission), also mandate OA publishing. This makes it relevant to measure the trend of OA publishing at UU.

How far the shift to OA publishing has come and the possibility and simplicity to achieve OA differs greatly between fields and publication patterns (Piwowar et al., 2018). It should be kept in mind that the results for OA presented in ABM are not field normalized, so direct comparisons between different fields or departments should be avoided.

There are different ways for a researcher to achieve OA and different ways to define a source of a publication as being OA. In ABM, we use the following definitions with respect to OA types of publications:

Gold OA: Articles published in an OA journal, in which all articles are accessible directly and freely on the journal or publisher website; books and book chapters accessible directly and freely on the publisher website. Gold OA may or may not involve publication fees (APC).

Hybrid OA: Articles published in a subscription journal but that are immediately free to read under an open license, in exchange for publication fees (APC).

Green OA: Accepted author manuscript versions or versions of record of articles published in a journal, but self-archived in open institutional or subject specific repositories, usually after an embargo period; self-archived books and book chapters. Green OA publications that also satisfies the definition for Gold or Hybrid OA are only assigned to these latter types and are thereby not counted as Green OA in ABM.

Bronze OA: Publications free to read on the journal or publisher website, but lack a clearly identifiable license or other open access-information. Bronze OA is not included in ABM.

In ABM, we use DiVA, DOAJ, OpenAPC and Unpaywall as primary sources to determine if a publication is OA, and, if this is the case, to determine the OA type of the publication. A publication *P* is considered to be OA in ABM if at least one of the following four conditions is satisfied:

- 1) P is classified as "gold", "hybrid" or "green" OA in Unpaywall (preprints excluded from "green").
- 2) P is classified as "gold" or "hybrid" in OpenAPC.
- 3) The full text of P is published OA in DiVA.
- 4) P is included in a journal classified as OA in DOAJ.

Some publications are reclassified as "hybrid" from "green" if data in both DiVA and Sherpa Romeo supports the reclassification.

For the OA part of ABM, the publication period is 2015-2022. The publication types taken into account are the same that are used in the Norwegian model analysis, i.e. article in journal or series, article in anthology and monograph.

3 Results

In this section, we report the results of ABM. We first give, as a background, some results for UU as a whole. We then report the results for the UU departments, grouped by scientific domain.

Each of the sections 3.2-3.4, which corresponds to scientific domains, initially puts forward tables, which correspond to faculties and which report publication volumes (absolute and relative) and WoS coverage by department and publication type. Regarding WoS coverage, the validity of bibliometric indicators are in general higher if the coverage is high compared to low. Within a given section corresponding to a scientific domain, like Section 3.2, the other results are grouped based on what is analyzed: publishing volume and publishing level (the Norwegian model), field normalized citation impact, collaboration, and OA. Within a group of the indicated kind, the results are grouped by faculty. Regarding the Norwegian model analysis, publication volumes by department and year are reported in Appendix 2.

Note that, as is indicated in the section "Data and methods", the results for publication volume, the Norwegian model and OA are based on DiVA, whereas the results for citation impact and collaboration are based on the in-house version of WoS available at CWTS.

3.1 UU as a whole

In Figure 1, an overview of the subject profile of UU is given.⁶ In the map of the figure, all WoS subject categories in which UU has at least one publication of the types "Article" or "Review" and published in the period 2012-2021 are represented (240 categories). The size of a node indicates the publication output of UU in the corresponding category, whereas the color of a node indicates citation impact, measured by the indicator MNCS. Note that the MNCS is determined only by the locally relevant scientific neighborhoods of the publications, i.e. by the classes of the publications (cf. Section 2.2), instead of the subject categories at large. The color coding is as follows:

- Blue: The MNCS, determined as indicated above, of the UU publications selected based on the subject category is far below world average
- Green: The MNCS, determined as indicated above, of the UU publications selected based on the subject category is around world average.
- Red: The MNCS, determined as indicated above, of the UU publications selected based on the subject category is far above world average.

Observe that the number of publications in some subject categories is very low. In such cases, the color of the category should be interpreted with caution.

⁶ The subject profile overview was inspired by the CWTS web page at the following address: <https://www.vosviewer.com/university-profile-maps>.

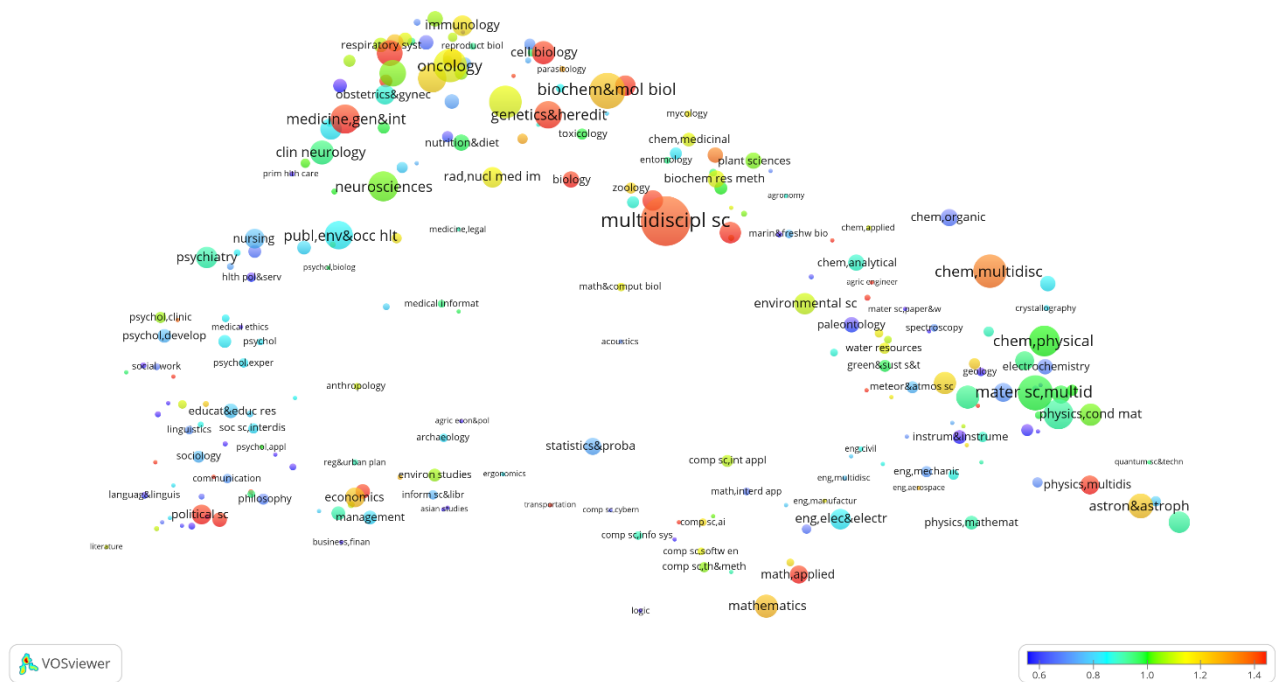


Figure 1. Subject profile map for UU. Publication period: 2012-2021. See above in this section for explanations.

In Figure 2, UUs proportion (in %) of the total number of publication fractions (P) for UU in combination with 10 benchmarking universities (see Table 2) is shown by publication year. The figure also shows UUs proportion of the total number of publication fractions belonging to the top 10% most frequently cited (P(top 10%)) for the same combination, where class (and thereby subject) and publication year of the publications are taken into account. The figure can be interpreted as the research production of UU over time, relative to a comparable set of universities.

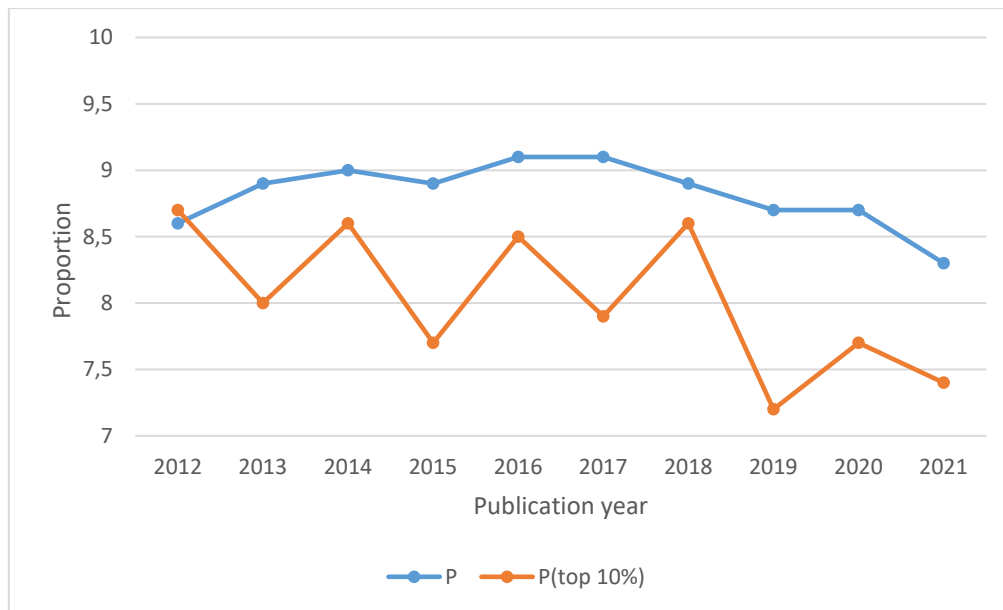


Figure 2. UUs proportion of publication fractions (P) and of publication fractions belonging to the top 10% most frequently cited (P(top 10%)), by publication year and with regard to UU in combination with 10 benchmarking universities. Publication period: 2012-2021.

In Table 2, the 10 benchmarking universities are listed, together with a brief motivation for their inclusion.

Table 2. The 10 benchmarking universities.

Benchmark university	Brief motivation for inclusion
Durham University	European reference, belonging to the Matariki ⁷ network
Eberhard Karls University Tübingen	European reference, belonging to the Matariki and Guild ⁸ networks
Ghent University	European reference, belonging to Enlight ⁹ and Guild
Lund University	Swedish reference, belonging to the SLUG ¹⁰ network
Stockholm University	Swedish reference, belonging to the SLUG network
University of Copenhagen	Nordic reference
University of Gothenburg	Swedish reference, belonging to the SLUG network
University of Groningen	European reference, belonging to Enlight and Guild
University of Helsinki	Nordic reference
University of Oslo	Nordic reference

In Figure 3, UUs proportion of OA publications, and UUs proportion by OA type, relative to the total publication output are shown (the proportions are given as percentages). For UU as a whole, the proportion of OA publications is increasing during the considered publication period (the uppermost curve). Note that, for a given publication period, the proportion Total OA is equal to the sum of the proportions across the three OA types.

⁷ The Matariki network is an international group of seven universities.

⁸ The Guild is a network of 21 European universities.

⁹ Enlight is a European University Network including nine partner universities (former U4Society).

¹⁰ SLUG is a Swedish network of the Stockholm, Lund, Uppsala and Gothenburg universities.

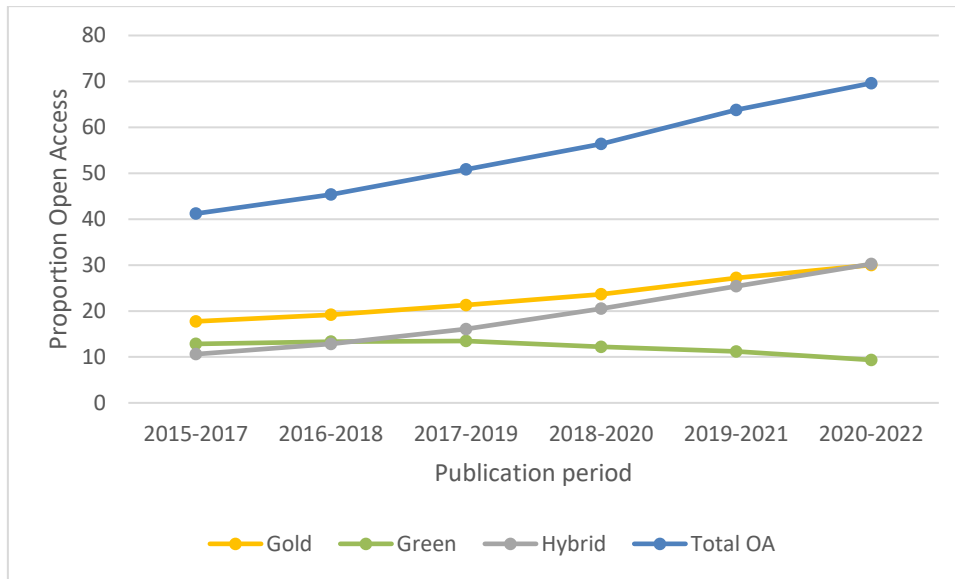


Figure 3. UU's proportion of OA publications, and UU's proportion by OA type, relative to the total publication output. Publication period: 2015-2022. 3-year moving average. See Section 2.4 for explanations of the types.

3.2 Humsam

The number of Humsam units of analysis included in ABM is 32: 29 departments and three faculties. For the latter, *Faculty of Law* and *Faculty of Theology* consists of only one large department each, responsible for all publications, and nearly all the publications of the *Faculty of Education* belong to the *Department of Education*.

Tables 3-6 report publication volume in terms of both fractional counts and full counts (within parentheses) by department (by faculty for Table 4) and publication type, and WoS coverage. WoS coverage concerns the number of WoS publications of the four types represented in the tables relative to all publications of these types for the department.

Table 3. Faculty of Arts. Publication volume by publication type, and WoS coverage (in %). Publication period: 2014-2022.

Department	Publication type				Total	WoS coverage
	Article	Article in anthology	Monograph	Conference paper		
ALM	97,0 (149)	67,6 (92)	4,3 (6)	21,9 (42)	190,7 (289)	32,1
Archaeology and Ancient History	195,9 (324)	219,1 (242)	21,7 (26)	23,9 (30)	460,6 (622)	23,9
Art History	73,4 (103)	100,8 (107)	10,0 (12)	22,9 (37)	207,1 (259)	18,7
Cultural Anthropology and Ethnology	110,1 (137)	125,6 (145)	23,3 (33)	4,3 (5)	263,4 (320)	13,3
Game Design	29,1 (78)	3,2 (5)	50,0 (50)	33,3 (49)	115,7 (182)	23,8
Gender Research	111,6 (166)	85,2 (110)	9,6 (13)	11,7 (19)	218,1 (308)	28,4
History	175,6 (203)	205,5 (233)	30,1 (35)	9,1 (10)	420,2 (481)	22,9
History of Ideas	136,1 (152)	135,1 (151)	14,5 (20)	2,3 (3)	288,1 (326)	21,5
Literature	89,5 (106)	243,1 (266)	40,6 (48)	6,1 (10)	379,4 (430)	4,0
Musicology	83,0 (88)	78,5 (86)	15,5 (17)	1,0 (1)	177,9 (192)	11,4
Philosophy	199,0 (215)	126,4 (141)	13,8 (15)	9,5 (10)	348,6 (381)	34,3

Table 4. Faculty of Education, Faculty of Law and Faculty of Theology. Publication volume by publication type, and WoS coverage (in %). Publication period: 2014-2022.

Faculty	Publication type				Total	WoS coverage
	Article	Article in anthology	Monograph	Conference paper		
Faculty of Education	375,4 (561)	317,5 (415)	33,1 (45)	48,6 (76)	774,6 (1097)	25,6
Faculty of Law	513,7 (582)	603,3 (649)	119,5 (141)	11,1 (15)	1247,6 (1387)	5,5
Faculty of Theology	284,3 (337)	356,3 (394)	64,2 (75)	13,0 (14)	717,8 (820)	20,0

Table 5. Faculty of Languages. Publication volume by publication type, and WoS coverage (in %). Publication period: 2014-2022.

Department	Publication type				Total	WoS coverage
	Article	Article in anthology	Monograph	Conference paper		
English	130,5 (152)	127,3 (141)	22,1 (24)	5,7 (7)	285,6 (324)	27,5
Linguistics and Philology	274,7 (350)	283,5 (328)	43,2 (49)	126,0 (201)	727,4 (928)	14,5
Modern Languages	195,1 (227)	215,6 (235)	18,2 (23)	18,3 (26)	447,2 (511)	10,8
Scandinavian Languages	279,6 (308)	123,7 (141)	14,3 (18)	54,1 (67)	471,7 (534)	6,4

Table 6. Faculty of Social Sciences. Publication volume by publication type, and WoS coverage (in %). Publication period: 2014-2022.

Department	Publication type				Total	WoS coverage
	Article	Article in anthology	Monograph	Conference paper		
Business Studies	251,7 (409)	201,8 (283)	36,1 (55)	93,0 (126)	582,4 (873)	33,1
Economic History	115,4 (155)	126,9 (155)	23,5 (30)	18,0 (25)	283,9 (365)	25,3
Economics	156,0 (303)	2,6 (5)	2,1 (5)	0,0 (0)	160,7 (313)	90,1
Food Studies, Nutrition and Dietetics	71,1 (196)	33,7 (39)	1,5 (2)	1,9 (4)	108,2 (241)	55,7
Government	362,1 (533)	178,6 (225)	29,0 (34)	19,8 (23)	589,5 (815)	48,6
Housing and Urban Research	158,3 (293)	120,9 (168)	15,0 (21)	22,2 (30)	316,5 (512)	32,6
Human Geography	163,7 (248)	66,0 (85)	7,4 (11)	3,5 (4)	240,6 (348)	56,2
Informatics and Media	92,7 (158)	89,8 (117)	6,4 (9)	78,7 (123)	267,7 (407)	38,3
Peace and Conflict Studies	235,6 (319)	111,5 (136)	16,8 (22)	7,5 (11)	371,5 (488)	54,5
Psychology	367,4 (871)	27,6 (38)	2,8 (4)	10,2 (18)	408,0 (931)	83,9
Russian and Eurasian Studies	207,5 (264)	102,0 (116)	15,0 (17)	9,8 (11)	334,4 (408)	29,4
Social work	29,5 (50)	19,3 (27)	1,5 (2)	0,3 (1)	50,7 (80)	32,4
Sociology	198,8 (306)	124,7 (171)	13,9 (21)	5,0 (10)	342,4 (508)	41,3
Statistics	90,4 (201)	0,0 (0)	1,0 (2)	2,8 (10)	94,2 (213)	92,0

3.2.1 Publishing Volume and Publishing Level – The Norwegian Model

Faculty of Arts

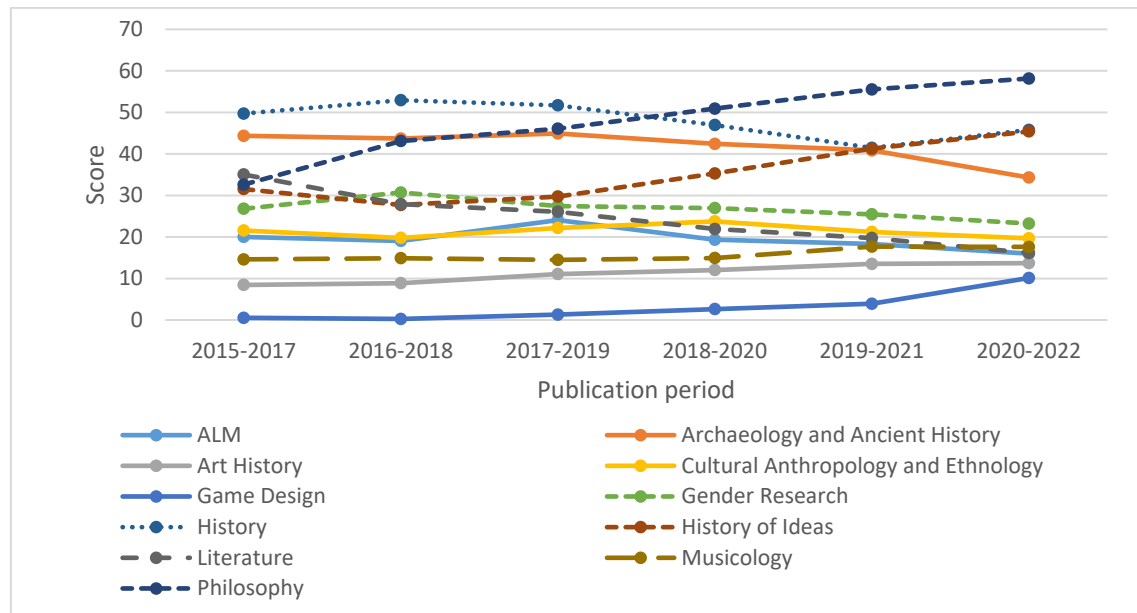


Figure 4. Faculty of Arts. Norwegian score by publication period. 3-year moving average.

Table 7. Faculty of Arts. Proportion (in %) publication fractions at level 2 relative to the sum of publication fractions across levels 1 and 2 (given within parentheses) by publication period. 3-year moving average.

Department	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021	2020-2022
ALM	37,7 (32,4)	32,7 (32,8)	47,4 (40,7)	43,9 (40,8)	40,6 (38)	28,3 (34,9)
Archaeology and Ancient History						
History	41,4 (100,3)	52,0 (91,9)	48,9 (93,7)	49,3 (94,4)	36,6 (95,8)	36,6 (85,4)
Art History	3,2 (24,7)	11,7 (22,0)	17,5 (25,7)	21,5 (26,7)	21,4 (33,8)	21,2 (33,0)
Cultural Anthropology and Ethnology						
Game Design	38,8 (45,6)	26,1 (51,7)	18,8 (54,8)	22,0 (54,4)	29,1 (41,8)	28,8 (37,8)
Gender Research	0,0 (1,6)	0,0 (0,9)	10,1 (3,3)	42,5 (4,3)	27,7 (7,8)	27,7 (20,0)
History of Ideas						
History	27,2 (56,7)	28,1 (68,4)	34,1 (56,3)	35,6 (63,1)	39,4 (53,4)	41,7 (49,9)
History of Ideas	38,6 (94,6)	42,1 (97,7)	38 (92,8)	36,3 (90,8)	30,9 (83,4)	32,3 (86,7)
History of Ideas	30,1 (62,6)	24,2 (65,5)	36,1 (61,0)	36,8 (70,6)	40,6 (77,6)	36,8 (83,7)
Literature	8,4 (71,0)	13,7 (58,4)	17,8 (56,1)	14,8 (51,7)	15,1 (54,2)	12,2 (50,6)
Musicology	41,7 (27,0)	43,8 (30,3)	39,8 (33,3)	45,7 (31,8)	53,2 (34,7)	53,3 (33,7)
Philosophy	44,0 (66,7)	46,0 (79,3)	45,0 (83,3)	48,3 (93,4)	56,0 (93,9)	62,1 (92,2)

Faculty of Education, Faculty of Law and Faculty of Theology

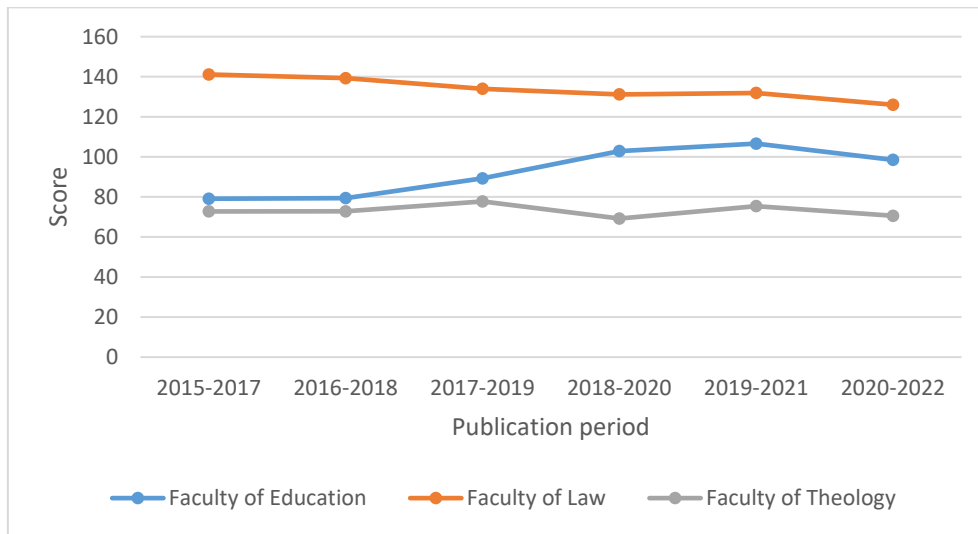


Figure 5. Faculty of Education, Faculty of Law and Faculty of Theology. Norwegian score by publication period. 3-year moving average.

Table 8. Faculty of Education, Faculty of Law and Faculty of Theology. Proportion (in %) publication fractions at level 2 relative to the sum of publication fractions across levels 1 and 2 (given within parentheses) by publication period. 3-year moving average.

Department	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021	2020-2022
Faculty of Education	25,9 (160,3)	27,2 (151,9)	29,2 (170,8)	26,9 (205,8)	29,5 (229,1)	27,1 (216,7)
Faculty of Law	22,8 (293,4)	19,9 (297,3)	15,5 (283,0)	13,7 (284,6)	12,7 (277,4)	14,4 (265,5)
Faculty of Theology	31,0 (158,9)	38,3 (152,6)	36,0 (162,0)	33,9 (148,9)	30,4 (170,8)	29,9 (168,1)

Faculty of Languages

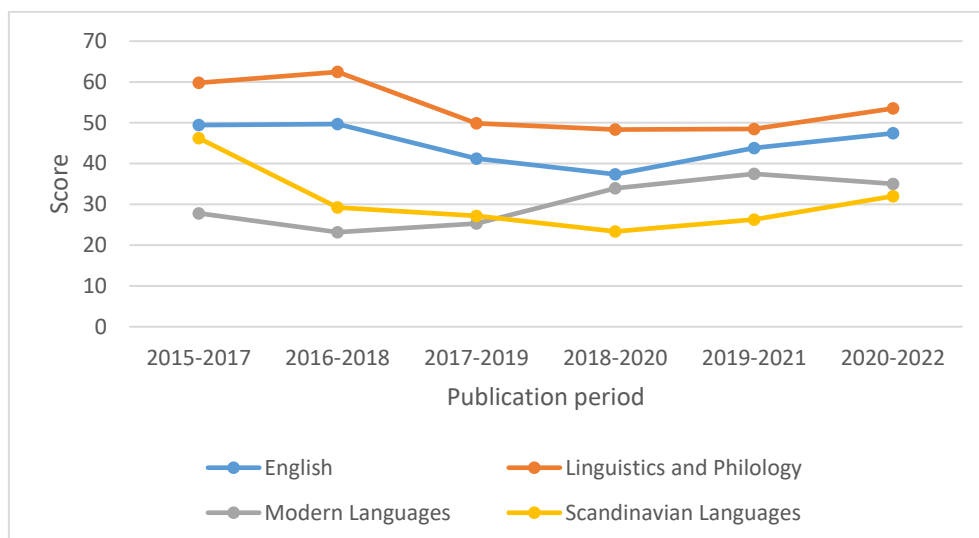


Figure 6. Faculty of Languages. Norwegian score by publication period. 3-year moving average.

Table 9. Faculty of Languages. Proportion (in %) publication fractions at level 2 relative to the sum of publication fractions across levels 1 and 2 (given within parentheses) by publication period. 3-year moving average.

Department	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021	2020-2022
English	46,3 (76,8)	44,2 (74,3)	46,7 (69,2)	46,6 (70,7)	51,6 (83,1)	48,0 (88,9)
Linguistics and Philology	47,2 (112,0)	51,7 (118,2)	43,7 (119,5)	43,3 (126,2)	39,3 (120,8)	39,0 (130,2)
Modern Languages	19,1 (77,8)	14,4 (76,3)	20,9 (71,8)	25,2 (81,4)	30,7 (81,0)	26,2 (79,7)
Scandinavian Languages	19,4 (107,2)	12,4 (75,0)	11,9 (71,3)	13,3 (60,0)	13,6 (69,7)	11 (85,1)

Faculty of Social Sciences

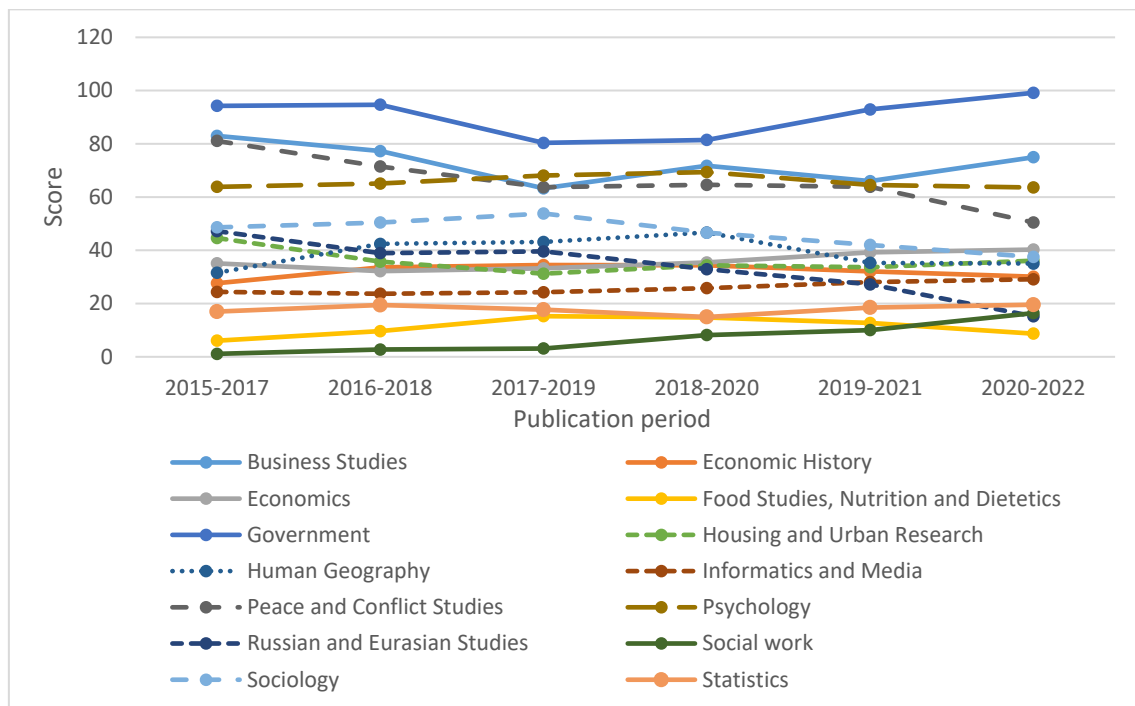


Figure 7. Faculty of Social Sciences. Norwegian score by publication period. 3-year moving average.

Table 10. Faculty of Social Sciences. Proportion (in %) publication fractions at level 2 relative to the sum of publication fractions across levels 1 and 2 (given within parentheses) by publication period. 3-year moving average.

Department	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021	2020-2022
Business Studies	38,7 (162,1)	39,8 (158,5)	36,0 (125,1)	31,7 (136,5)	35,8 (124,7)	40,0 (134,7)
Economic History	33,7 (64,7)	38,9 (65,3)	39,2 (57,6)	40,2 (57,1)	37,1 (53,1)	37,8 (48,9)
Economics	50,4 (51,2)	51,3 (46,4)	55,8 (44,9)	55,6 (49,5)	52,6 (57,1)	58,6 (56,2)
Food Studies, Nutrition and Dietetics	12,8 (16,3)	7,9 (26,3)	11,1 (43,5)	11,7 (41,6)	12,9 (35,7)	9,2 (22,1)
Government	44,1 (167,9)	44,3 (178,6)	42,9 (154,9)	33,8 (160,2)	37,4 (158,8)	40,7 (170,1)
Housing and Urban Research	31,1 (92,2)	34,3 (71,0)	41,2 (61,0)	32,8 (62,3)	34,0 (59,6)	29,2 (68,5)
Human Geography	43,9 (61,0)	44,8 (70,5)	37,6 (73,6)	32,9 (76,2)	24,9 (66,5)	25 (68,1)
Informatics and Media	21,8 (55,0)	28,6 (59,0)	26,7 (70,2)	27,1 (75,9)	27,5 (77,7)	24,7 (69,2)
Peace and Conflict Studies	54,7 (133,4)	55,9 (133,0)	52,9 (113,5)	49,6 (107,2)	50,9 (99,7)	45,4 (86,8)
Psychology	25,7 (135,2)	27,9 (132,7)	31,5 (126,6)	33,9 (122,8)	27,5 (124,6)	26,7 (126,1)
Russian and Eurasian Studies	33,6 (103,6)	28,3 (79,3)	34,0 (64,5)	33,2 (58,5)	32,1 (54)	18,0 (46,2)
Social work	0,0 (3,5)	15,8 (7,9)	13,3 (9,4)	14,1 (17,1)	22,3 (18,3)	26,4 (31,8)
Sociology	27,6 (106,2)	33,5 (107,2)	41,9 (112,8)	40,6 (104,1)	34,5 (94,8)	26,3 (77,5)
Statistics	29,3 (29,6)	34,5 (32,9)	30,3 (33,1)	26,2 (29,6)	28,1 (35,7)	30,1 (36,7)

3.2.2 Field Normalized Citation Impact

In each graph in this section, the label of the vertical axis that corresponds to the world average for the citation indicator of the graph is in green color.

Faculty of Arts

Table 11. Faculty of Arts. Publication fractions (P; full counts within parentheses), MNCS, PP(top 10%), MNJS and MJPP(top10%) for the whole publication period 2014-2021.

Department	Indicator				
	P	MNCS	PP(top 10%)	MNJS	MJPP(top 10%)
ALM	38,3 (67)	0,75	5,5	0,75	5,4
Archaeology and Ancient History	49,1 (132)	1,02	12,9	0,90	10,2
Art History	7,3 (19)	null	null	null	null
Cultural Anthropology and Ethnology	11,8 (17)	null	null	null	null
Game Design	2,5 (8)	null	null	null	null
Gender Research	28,5 (54)	0,66	5,1	0,84	5,3
History	12,2 (18)	null	null	null	null
History of Ideas	6,6 (11)	null	null	null	null
Literature	1,0 (1)	null	null	null	null
Musicology	1,7 (3)	null	null	null	null
Philosophy	53,1 (58)	0,68	4,2	0,91	8,7

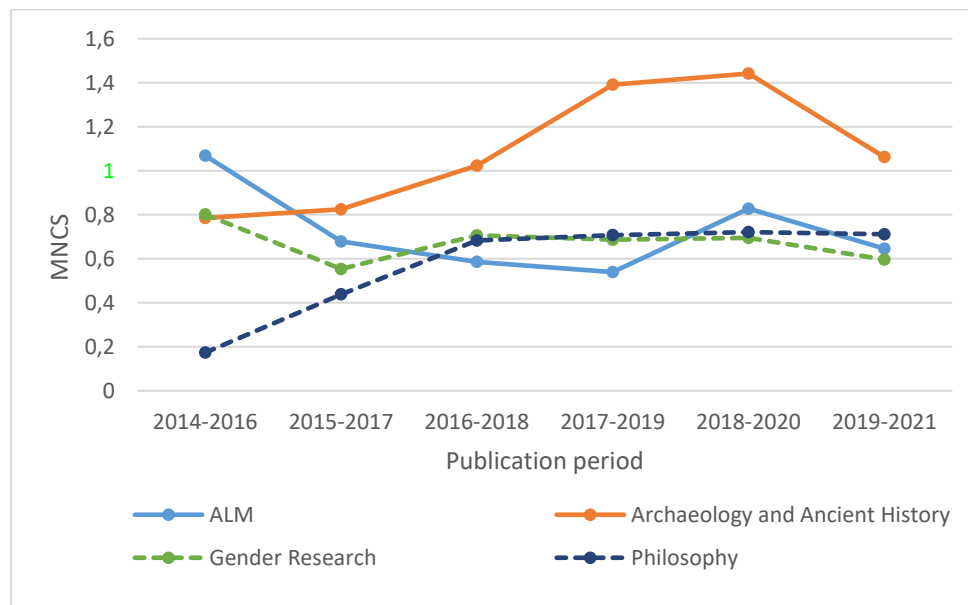


Figure 8. Faculty of Arts. MNCS by publication period. 3-year moving average.

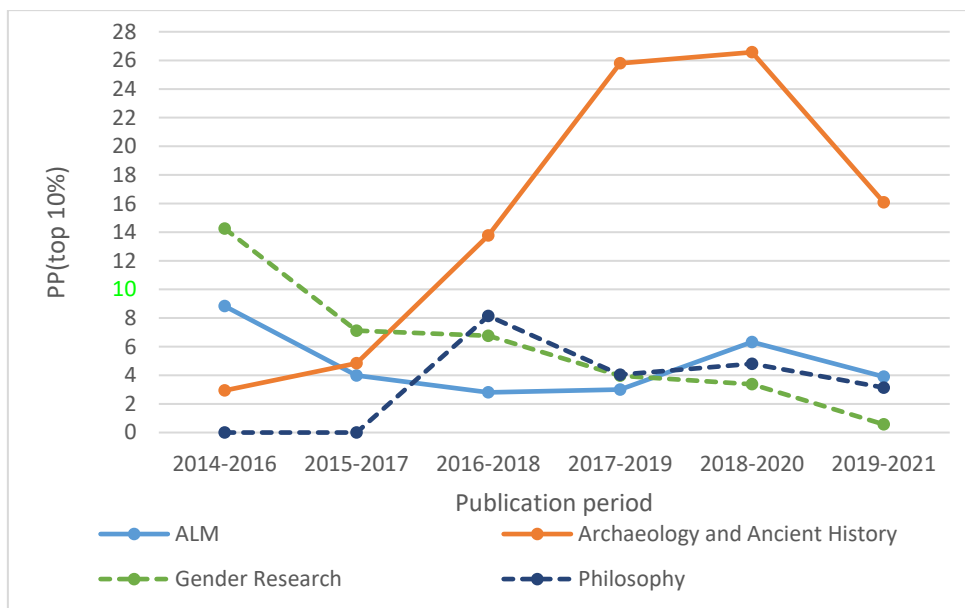


Figure 9. Faculty of Arts. PP(top 10%) by publication period. 3-year moving average.

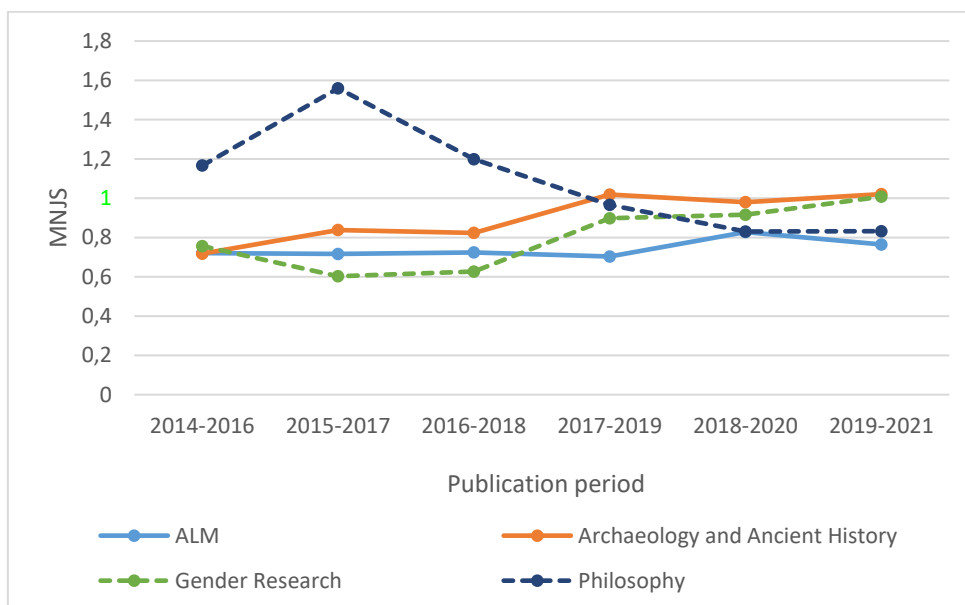


Figure 10. Faculty of Arts. MNJS by publication period. 3-year moving average.

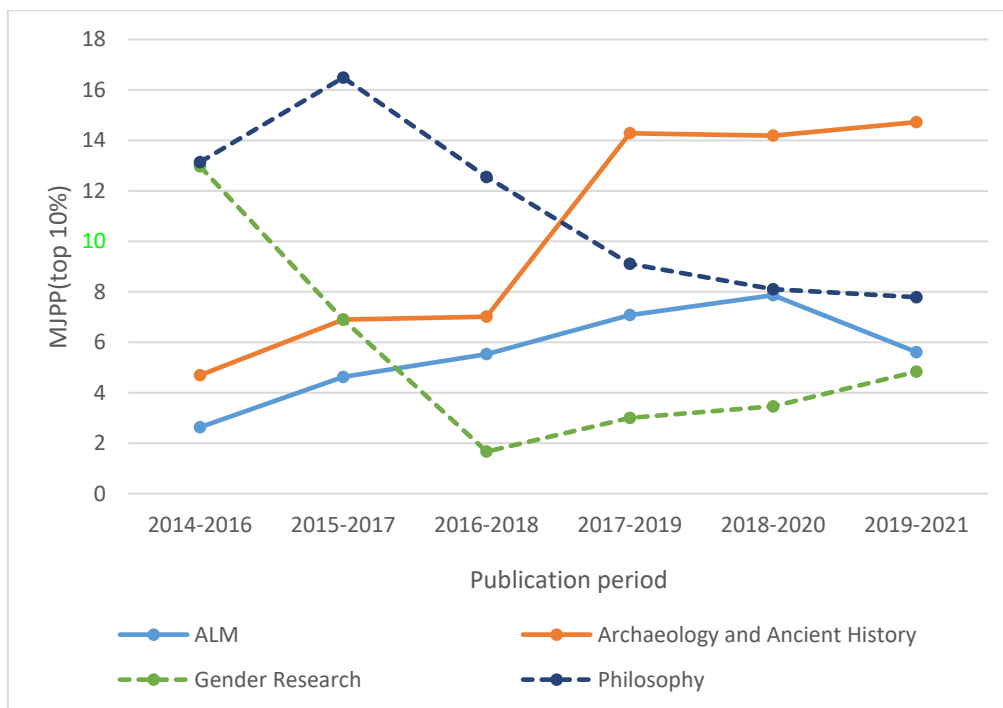


Figure 11. Faculty of Arts. MJPP(top 10%) by publication period. 3-year moving average.

Faculty of Education, Faculty of Law and Faculty of Theology

Table 12. Faculty of Education, Faculty of Law and Faculty of Theology. Publication fractions (P; full counts within parentheses), MNCS, PP(top 10%), MNJS and MJPP(top10%) by department and for the whole publication period 2014-2021.

Department	P	MNCS	Indicator		
			PP(top 10%)	MNJS	MJPP(top 10%)
Faculty of Education	102,0 (186)	0,81	5,2	0,87	8,1
Faculty of Law	23,5 (41)	0,49	1,8	0,57	3,0
Faculty of Theology	17,8 (33)	null	null	null	null

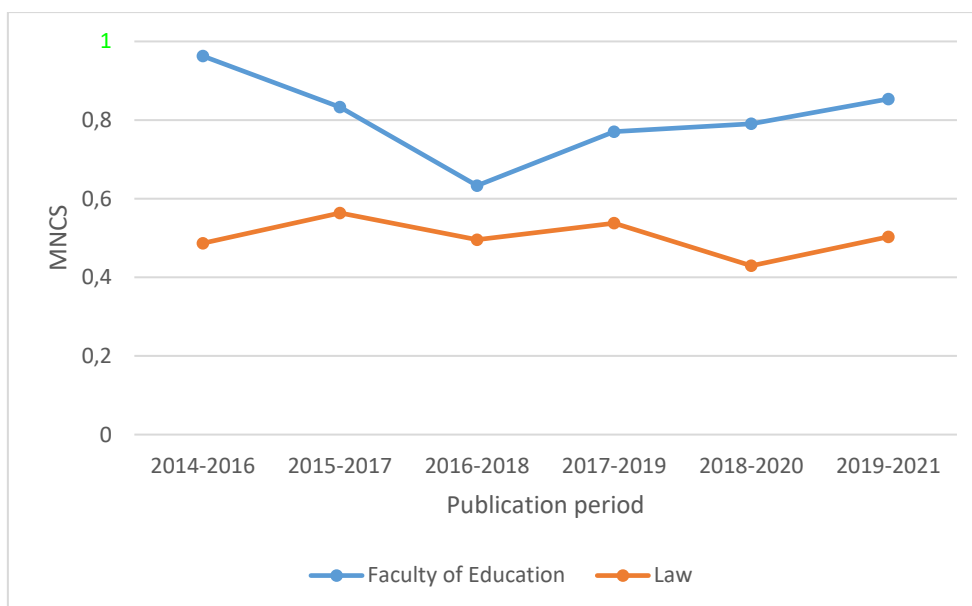


Figure 12. Faculty of Education. MNCS by publication period. 3-year moving average.

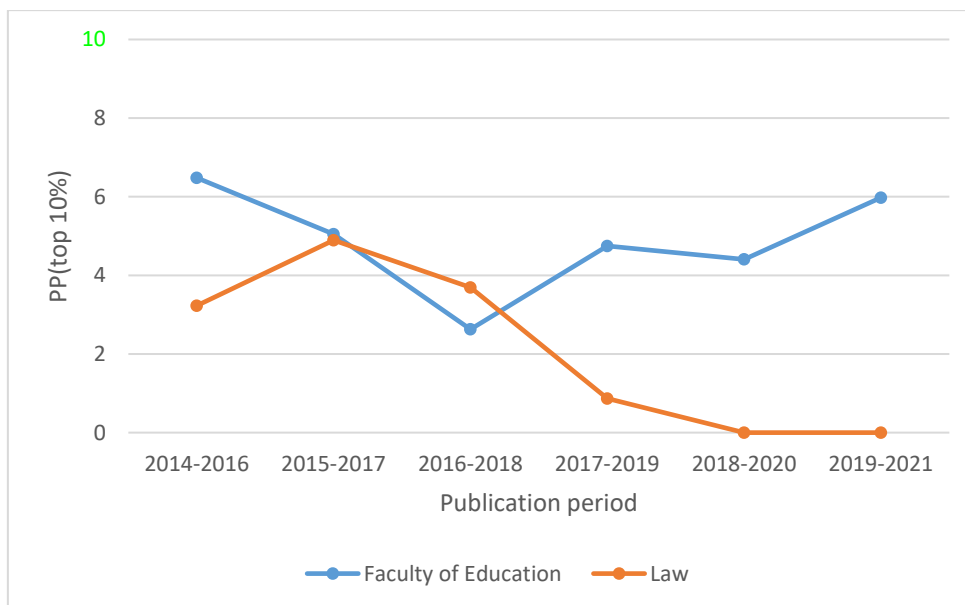


Figure 13. Faculty of Education. PP(top 10%) by publication period. 3-year moving average.

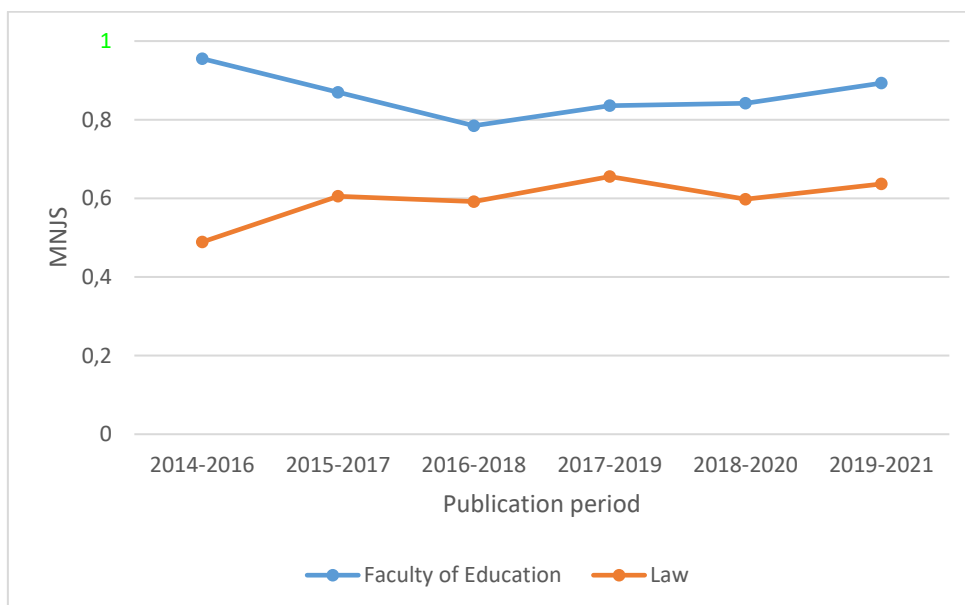


Figure 14. Faculty of Education. MNJS by publication period. 3-year moving average.

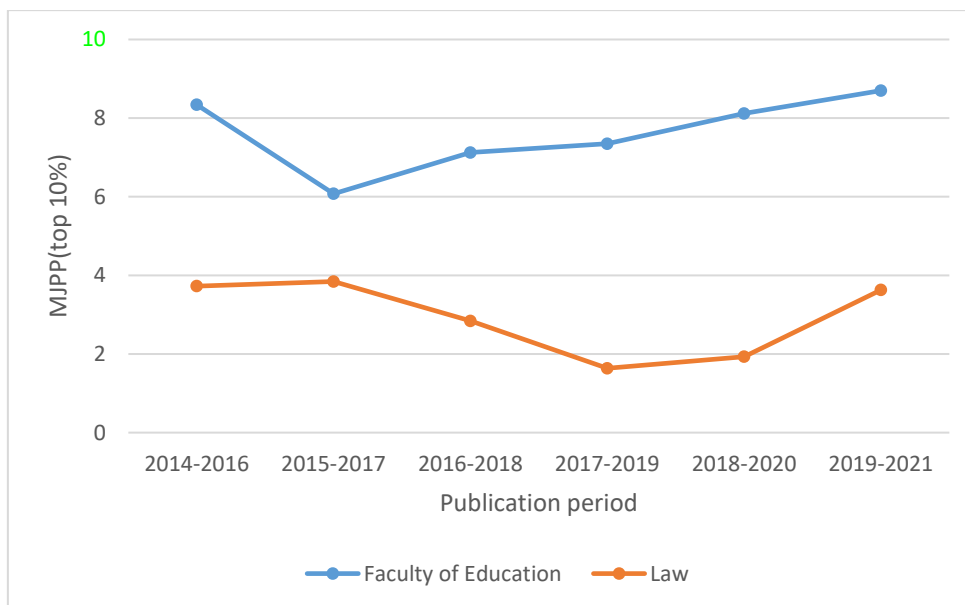


Figure 15. Faculty of Education. MJPP(top 10%) by publication period. 3-year moving average.

Faculty of Languages

Table 13. Faculty of Languages. Publication fractions (P; full counts within parentheses), MNCS, PP(top 10%), MNJS and MJPP(top10%) for the whole publication period 2014-2021.

Department	Indicator				
	P	MNCS	PP(top 10%)	MNJS	MJPP(top 10%)
English	13,0 (20)	null	null	null	null
Linguistics and Philology	17,6 (40)	1,14	15,0	0,86	9,1
Modern Languages	0,5 (3)	null	null	null	null
Scandinavian Languages	9,2 (17)	null	null	null	null

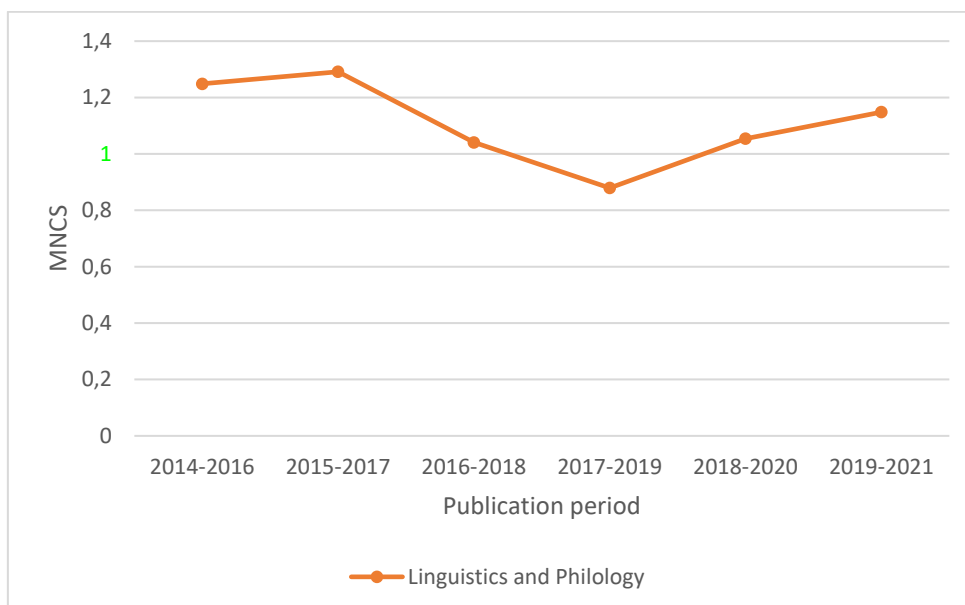


Figure 16. Faculty of Languages. MNCS by publication period. 3-year moving average.

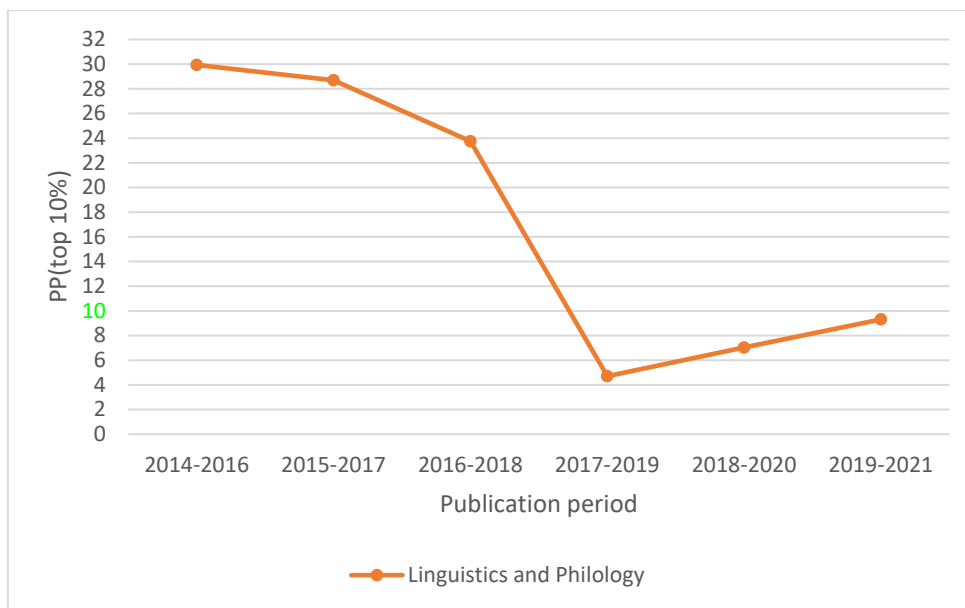


Figure 17. Faculty of Languages. PP(top 10%) by publication period. 3-year moving average.

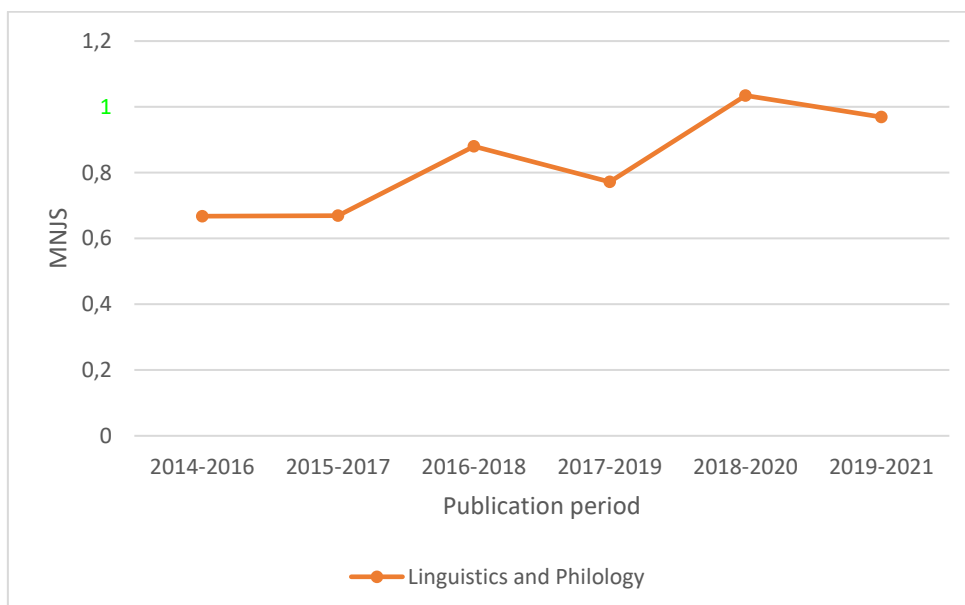


Figure 18. Faculty of Languages. MNJS by publication period. 3-year moving average.

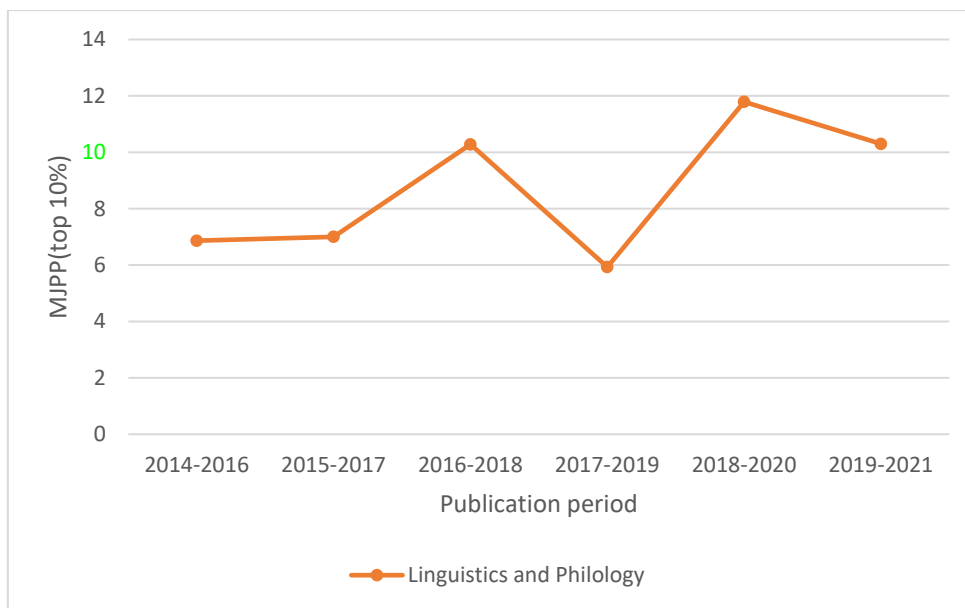


Figure 19. Faculty of Languages. MJPP(top 10%) by publication period. 3-year moving average.

Faculty of Social Sciences

Table 14. Faculty of Social Sciences. Publication fractions (P; full counts within parentheses), MNCS, PP(top 10%), MNJS and MJPP(top10%) by department and for the whole publication period 2014-2021.

Department	Indicator				
	P	MNCS	PP(top 10%)	MNJS	MJPP(top 10%)
Business Studies	97,3 (206)	0,86	7,7	0,97	8,8
Economic History	24,8 (44)	0,52	2,9	0,68	4,3
Economics	96,8 (229)	1,31	16,4	1,25	16,1
Food Studies, Nutrition and Dietetics	43,1 (142)	0,69	4,8	0,76	7,1
Government	175,4 (295)	0,98	11,0	1,03	10,5
Housing and Urban Research	71,9 (164)	1,33	14,6	1,24	11,2
Human Geography	85,8 (149)	1,09	14,6	1,25	16,3
Informatics and Media	29,6 (62)	0,59	5,1	0,74	7,4
Peace and Conflict Studies	123,0 (191)	2,38	26,4	1,37	15,2
Psychology	249,7 (634)	0,96	8,7	0,99	9,6
Russian and Eurasian Studies	28,2 (47)	0,72	2,7	0,79	7,1
Social work	6,1 (12)	null	null	null	null
Sociology	70,8 (132)	0,90	8,2	0,82	6,8
Statistics	55,7 (136)	0,50	2,9	0,83	7,0

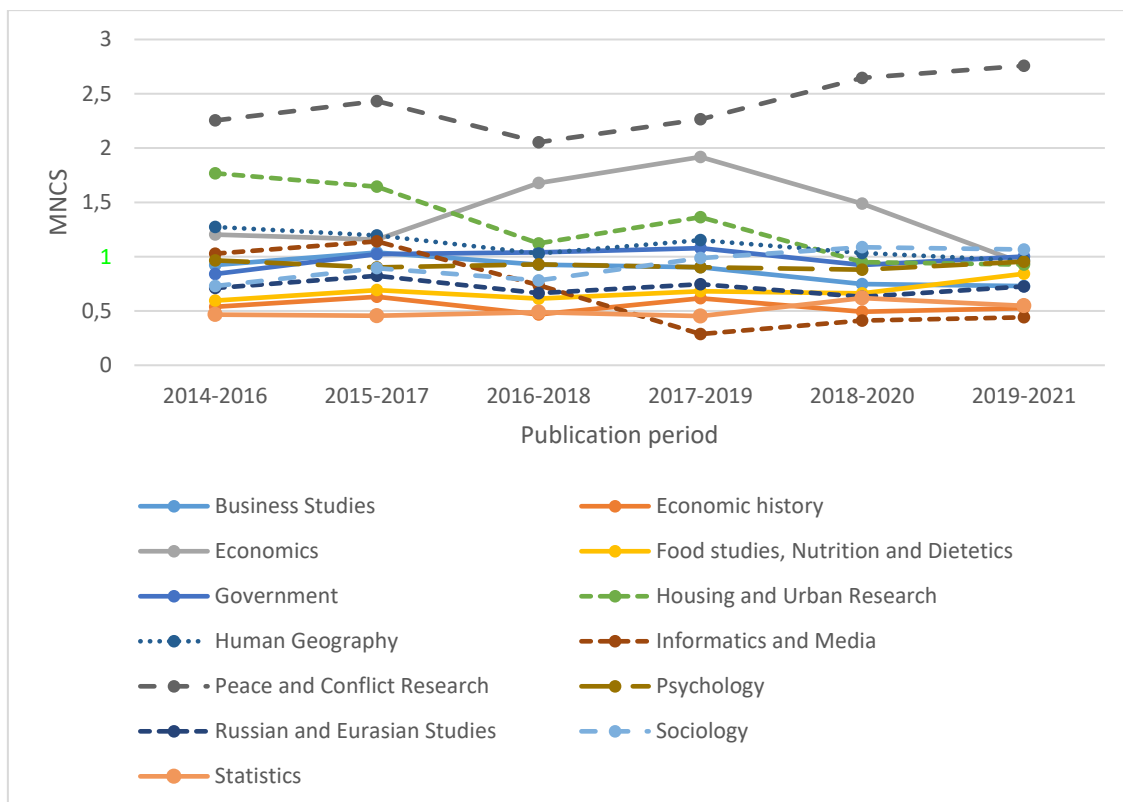


Figure 20. Faculty of Social Sciences. MNCS by publication period. 3-year moving average.

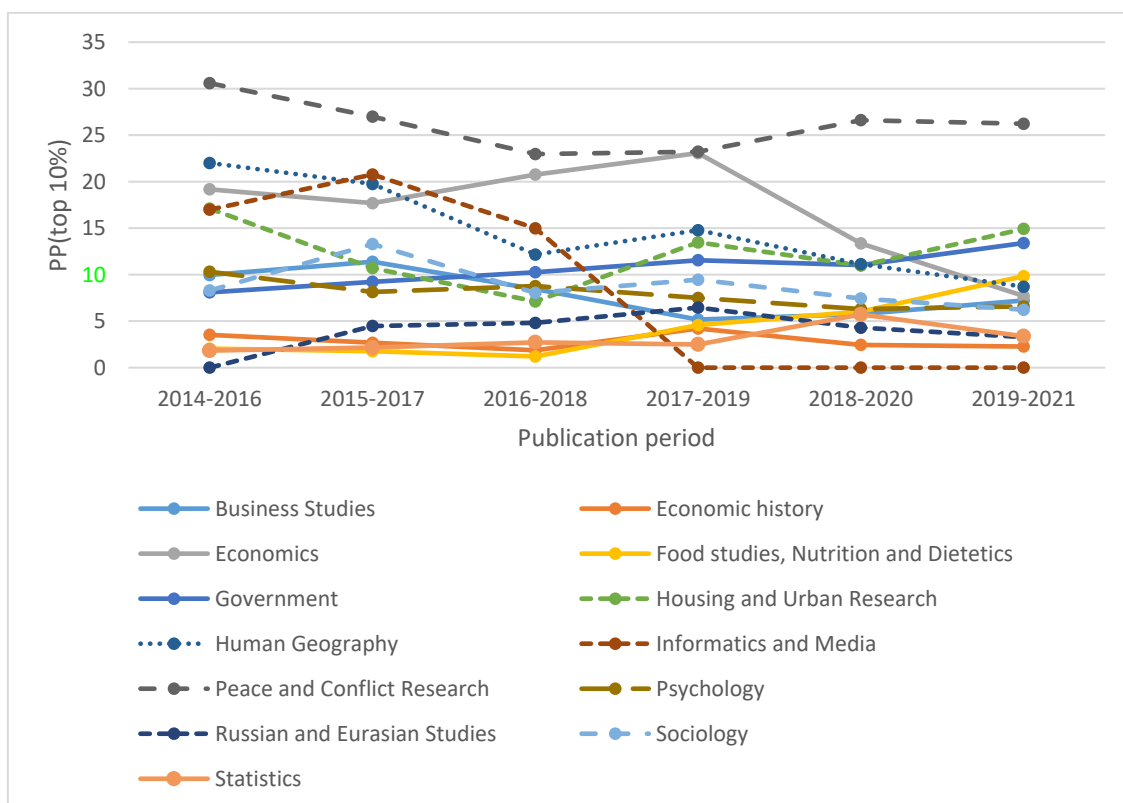


Figure 21. Faculty of Social Sciences. PP(top 10%) by publication period. 3-year moving average.

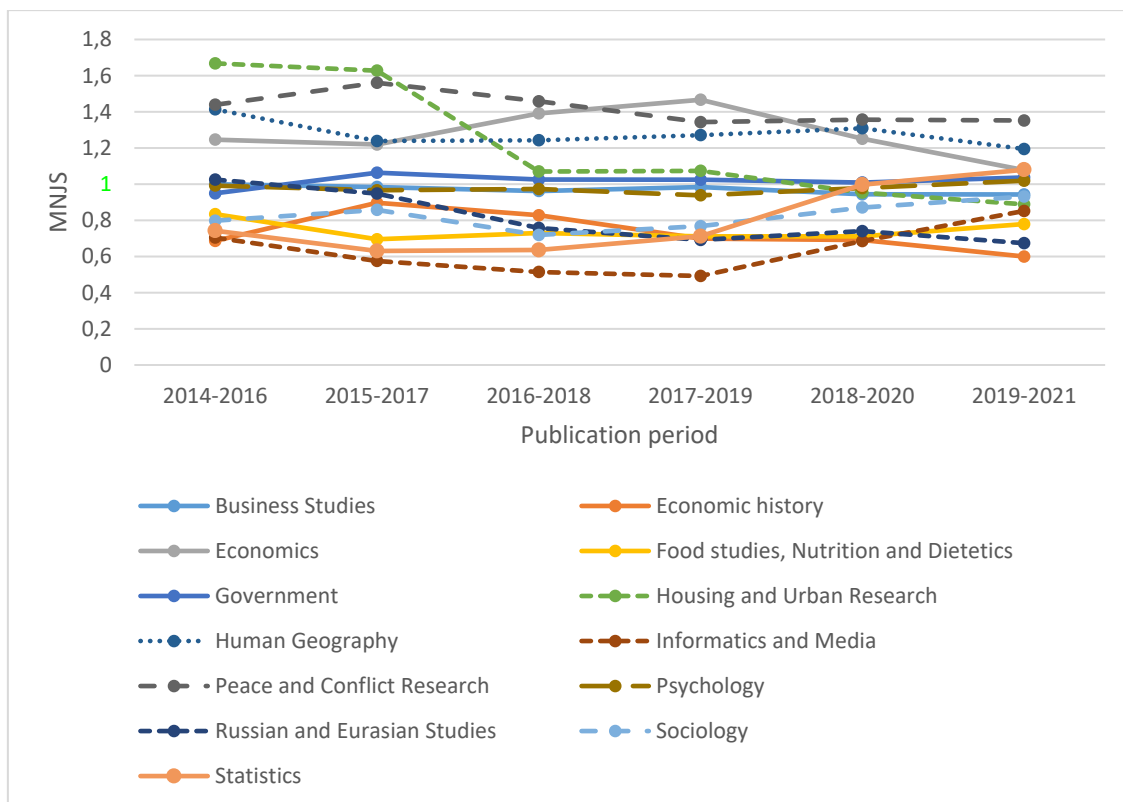


Figure 22. Faculty of Social Sciences. MNJS by publication period. 3-year moving average.

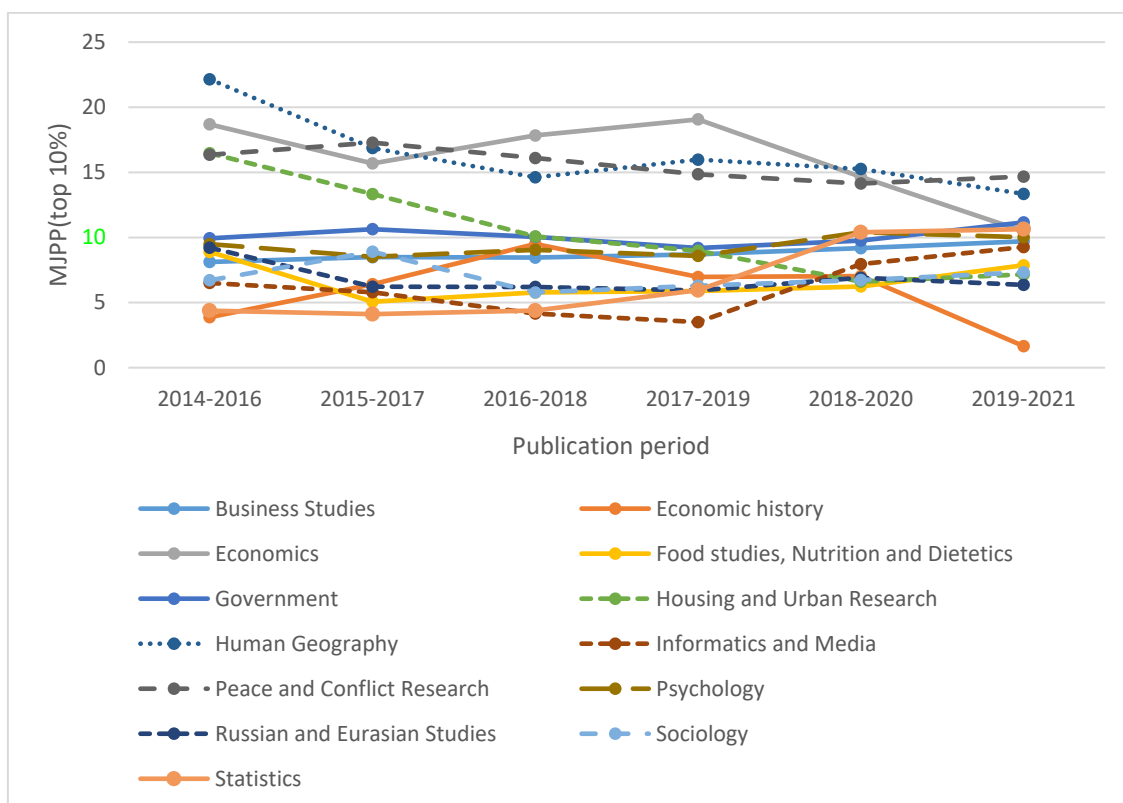


Figure 23. Faculty of Social Sciences. MJPP(top 10%) by publication period. 3-year moving average.

3.2.3 Collaboration

For all tables in this section, PP(int collab) and PP(industry) are given as percentages.

Faculty of Arts

Table 15. Faculty of Arts. Publications (P, full counts), PP(int collab) and PP(industry) for the whole publication period 2014-2021.

Department	Indicator		
	P	PP(int collab)	PP(industry)
ALM	67	44,8	0,0
Archaeology and Ancient History	132	73,5	3,0
Art History	19	73,7	5,3
Cultural Anthropology and Ethnology	17	11,8	0,0
Game Design	8	75,0	25,0
Gender Research	54	25,9	3,7
History	18	27,8	0,0
History of Ideas	11	18,2	0,0
Literature	1	0,0	0,0
Musicology	3	33,3	0,0
Philosophy	58	8,6	0,0

In Tables 16 and 20, which gives values of PP(int collab) and PP(industry) by publication period, “-“ in a table cell indicates that indicator values for the corresponding department and period cannot be obtained, since the department has no WoS publications (of the type “Article” or “Review”) in the period.

Table 16. Faculty of Arts. PP(int collab) and PP(industry) (within parentheses) by publication period. 3-year moving average.

Department	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021
ALM	37,5 (0,0)	38,1 (0,0)	33,4 (0,0)	40,7 (0,0)	46,9 (0,0)	51,6 (0,0)
Archaeology and Ancient History	74,2 (0,0)	73,8 (2,4)	75,0 (5,4)	80,0 (4,3)	81,8 (4,5)	71,7 (1,7)
Art History	100,0 (0,0)	80,0 (0,0)	66,7 (0,0)	50,0 (12,5)	60,0 (20,0)	62,5 (12,5)
Cultural Anthropology and Ethnology	14,3 (0,0)	14,3 (0,0)	0,0 (0,0)	0,0 (0,0)	14,3 (0,0)	12,5 (0,0)
Game Design	100,0 (100,0)	100,0 (100,0)	100,0 (100,0)	50,0 (50,0)	50,0 (25,0)	66,7 (0,0)
Gender Research	38,5 (7,7)	18,8 (6,3)	25,0 (5,0)	23,8 (4,8)	22,2 (3,7)	23,1 (3,9)
History	0,0 (0,0)	12,5 (0,0)	33,3 (0,0)	40 (0,0)	44,5 (0,0)	33,3 (0,0)
History of Ideas	0,0 (0,0)	20,0 (0,0)	16,7 (0,0)	33,3 (0,0)	33,3 (0,0)	25,0 (0,0)
Literature	-	-	-	-	-	0,0 (0,0)
Musicology	100,0 (0,0)	50,0 (0,0)	0,0 (0,0)	0,0 (0,0)	0,0 (0,0)	-
Philosophy	0,0 (0,0)	14,3 (0,0)	7,7 (0,0)	3,7 (0,0)	5,9 (0,0)	9,3 (0,0)

Faculty of Education, Faculty of Law and Faculty of Theology

Table 17. Faculty of Education, Faculty of Law and Faculty of Theology. Publications (P, full counts), PP(int collab) and PP(industry) for the whole publication period 2014-2021.

Department	Indicator		
	P	PP(int collab)	PP(industry)
Faculty of Education	186	33,3	0,0
Faculty of Law	41	31,7	0,0
Faculty of Theology	33	45,5	0,0

Table 18. Faculty of Education, Faculty of Law and Faculty of Theology. PP(int collab) and PP(industry) (within parentheses) by publication period. 3-year moving average.

Department	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021
Faculty of Education	32,5 (0,0)	28,4 (0,0)	38,9 (0,0)	36,4 (0,0)	37,9 (0,0)	31,1 (0,0)
Faculty of Law	28,6 (0,0)	15,4 (0,0)	21,0 (0,0)	26,3 (0,0)	38,9 (0,0)	46,2 (0,0)
Faculty of Theology	40,0 (0,0)	41,7 (0,0)	54,6 (0,0)	61,6 (0,0)	53,9 (0,0)	43,8 (0,0)

Faculty of Languages

Table 19. Faculty of Languages. Publications (P, full counts), PP(int collab) and PP(industry) for the whole publication period 2014-2021.

Department	Indicator		
	P	PP(int collab)	PP(industry)
English	20	50,0	0,0
Linguistics and Philology	40	75,0	2,5
Modern Languages	3	33,3	0,0
Scandinavian Languages	17	17,6	0,0

Table 20. Faculty of Languages. PP(int collab) and PP(industry) (within parentheses) by publication period. 3-year moving average.

Department	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021
English	25,0 (0,0)	0,0 (0,0)	11,1 (0,0)	12,5 (0,0)	62,5 (0,0)	88,9 (0,0)
Linguistics and Philology	70,0 (10,0)	71,4 (0,0)	76,9 (0,0)	85,7 (0,0)	68,8 (0,0)	75,0 (0,0)
Modern Languages	0,0 (0,0)	0,0 (0,0)	-	-	-	100,0 (0,0)
Scandinavian Languages	11,1 (0,0)	0,0 (0,0)	0,0 (0,0)	16,7 (0,0)	28,6 (0,0)	40,0 (0,0)

Faculty of Social Sciences

Table 21. Faculty of Social Sciences. Publications (P, full counts), PP(int collab) and PP(industry) for the whole publication period 2014-2021.

Department	Indicator		
	P	PP(int collab)	PP(industry)
Business Studies	206	61,7	1,9
Economic History	44	38,6	0,0
Economics	229	51,1	0,9
Food studies, Nutrition and Dietetics	142	66,2	0,7
Government	295	34,6	2,0
Housing and Urban Research	164	50,6	0,6
Human Geography	149	43,0	3,3
Informatics and Media	62	46,8	8,1
Peace and Conflict Research	191	46,1	0,0
Psychology	634	49,5	2,1
Russian and Eurasian Studies	47	38,3	0,0
Social work	12	16,7	0,0
Sociology	132	34,8	0,0
Statistics	136	42,7	0,7

Table 22. Faculty of Social Sciences. PP(int collab) and PP(industry) (within parentheses) publication period. 3-year moving average.

Department	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021
Business Studies	62,3 (0,0)	63,9 (0,0)	61,6 (1,4)	56,5 (1,4)	59,3 (2,3)	62,4 (3,2)
Economic History	42,9 (0,0)	30,0 (0,0)	35,7 (0,0)	47,1 (0,0)	47,4 (0,0)	38,1 (0,0)
Economics	46,8 (0,0)	40,2 (0,0)	46,1 (0,0)	48,8 (1,2)	55,4 (2,2)	56,4 (2,0)
Food studies, Nutrition and Dietetics	53,8 (0,0)	65,8 (2,7)	70,9 (1,8)	69,1 (1,5)	70,3 (0,0)	68,1 (0,0)
Government	34,6 (2,5)	35,2 (1,1)	40,2 (2,7)	37,4 (2,6)	30,7 (2,5)	30,4 (1,4)
Housing and Urban Research	48,2 (0,0)	51,0 (0,0)	62,5 (0,0)	63,1 (2,2)	60,0 (1,7)	48,0 (1,3)
Human Geography	35,0 (0,0)	34,9 (0,0)	39,0 (1,7)	38,8 (1,5)	49,3 (2,9)	52,5 (6,8)
Informatics and Media	60,0 (10,0)	80,0 (0,0)	64,3 (0,0)	44,4 (11,1)	34,8 (8,7)	36,3 (9,1)
Peace and Conflict Research	41,4 (0,0)	42,3 (0,0)	42,4 (0,0)	45,6 (0,0)	49,4 (0,0)	51,7 (0,0)
Psychology	48,8 (3,6)	43,8 (3,7)	41,5 (2,6)	42,1 (2,0)	48,1 (1,2)	57,1 (0,7)
Russian and Eurasian Studies	30,8 (0,0)	45,5 (0,0)	75,0 (0,0)	47,4 (0,0)	50,0 (0,0)	32,0 (0,0)
Social work	0,0 (0,0)	0,0 (0,0)	100,0 (0,0)	33,3 (0,0)	14,3 (0,0)	10,0 (0,0)
Sociology	19,0 (0,0)	28,2 (0,0)	25,5 (0,0)	43,1 (0,0)	44,6 (0,0)	50,0 (0,0)
Statistics	42,9 (0,0)	39,6 (0,0)	42,1 (1,8)	35,7 (1,8)	45,6 (1,8)	46,8 (0,0)

3.2.4 Open Access

For all figures in this section, proportion OA publications is given as a percentage. Total OA is defined as publications belonging to any type of OA (gold, hybrid or green).

Faculty of Arts

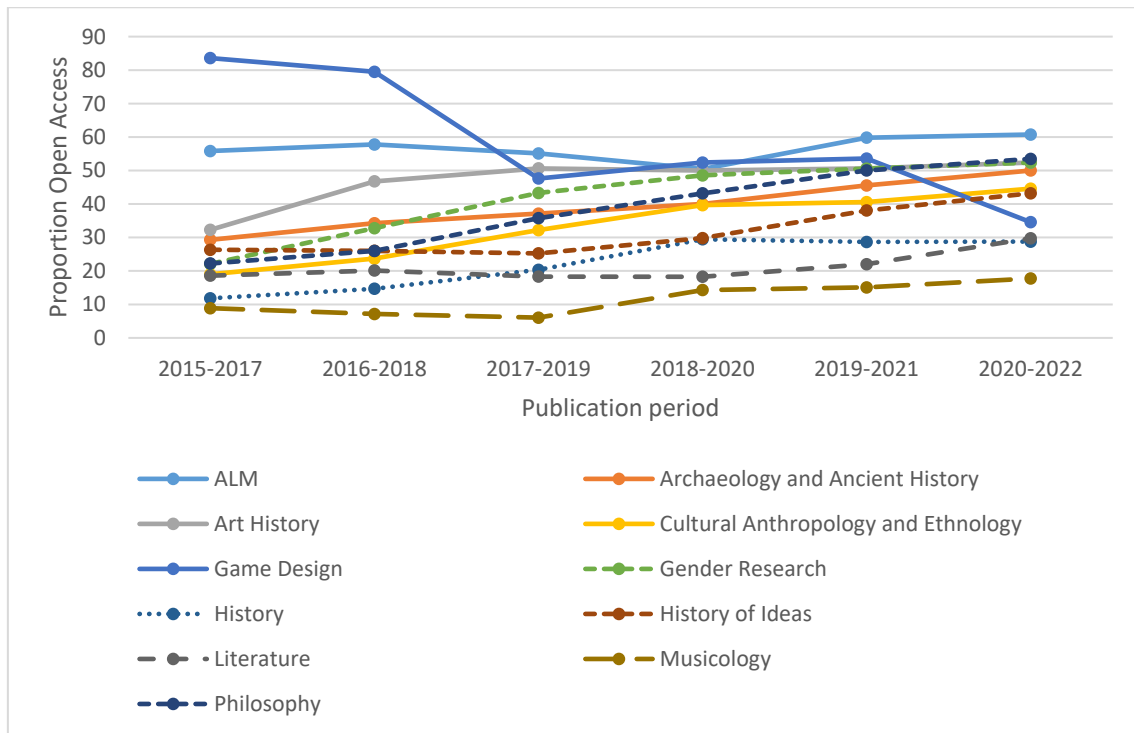


Figure 24. Faculty of Arts. Total OA by publication period. 3-year moving average.

Faculty of Education, Faculty of Law and Faculty of Theology

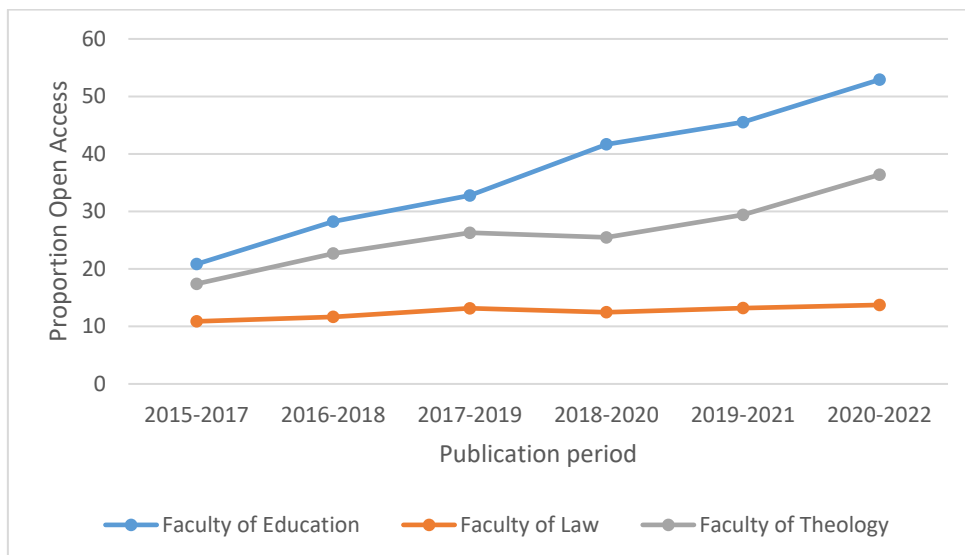


Figure 25. Faculty of Education, Faculty of Law and Faculty of Theology. Total OA by publication period. 3-year moving average.

Faculty of Languages

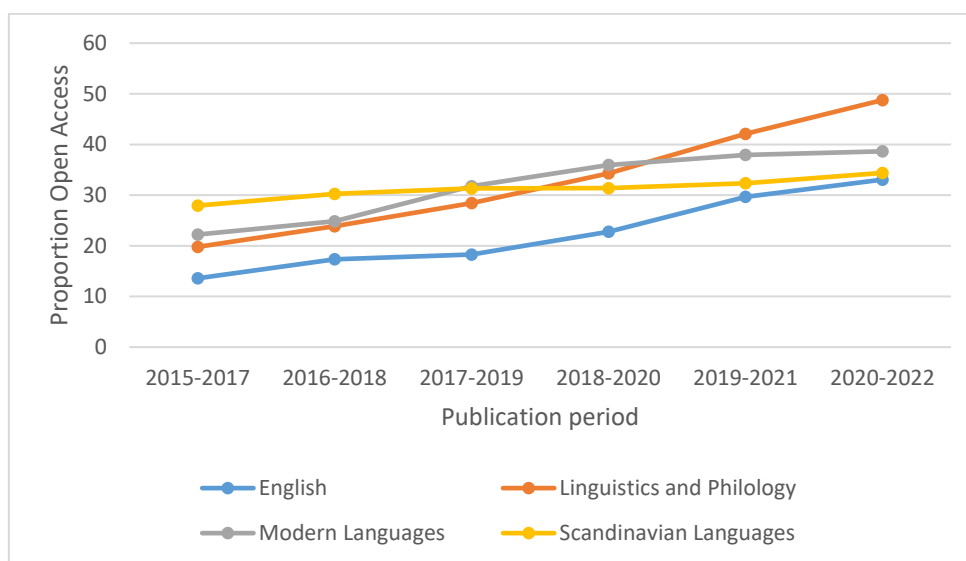


Figure 26. Faculty of Languages. Total OA Access by publication period. 3-year moving average.

Faculty of Social Sciences

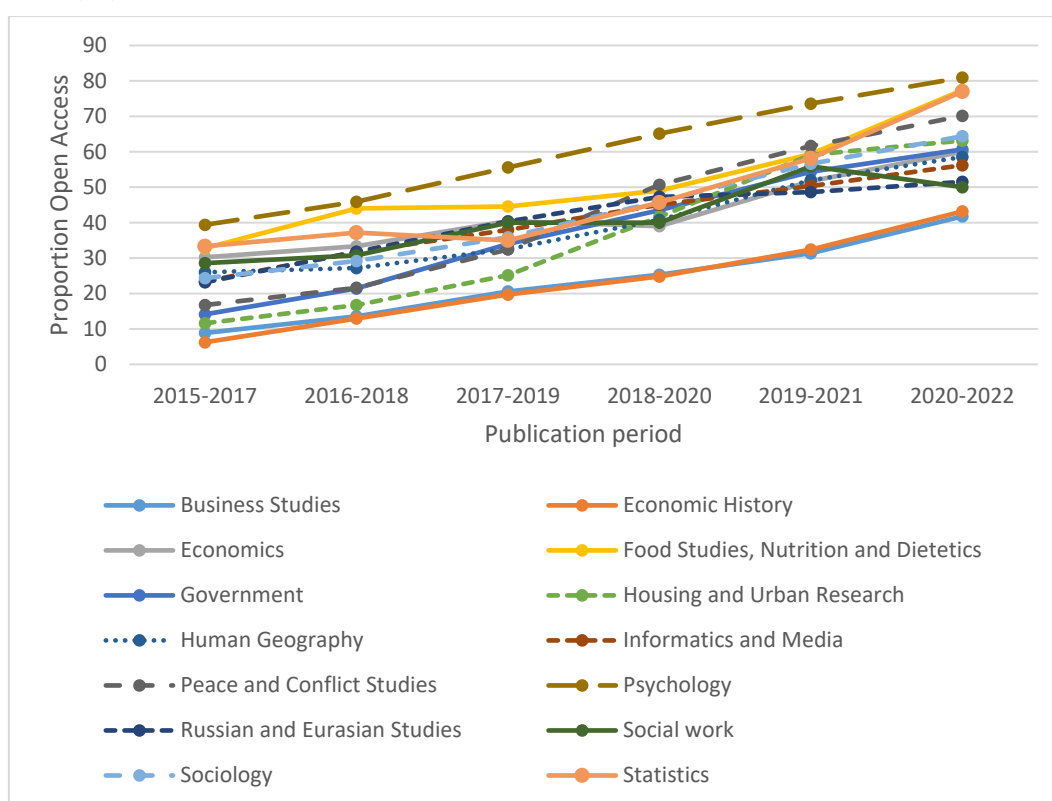


Figure 27. Faculty of Social Sciences. Total OA by publication period. 3-year moving average.

3.3 Medfarm

The number of Medfarm departments included in ABM is 10. Tables 23-24 report publication volume in terms of both fractional counts and full counts (within parentheses) by department and publication type, and WoS coverage. WoS coverage concerns the number of WoS publications of the four types represented in the tables relative to all publications of these types for the department.

Table 23. Faculty of Medicine. Publication volume by publication type, and WoS coverage (in %). Publication period: 2014-2022.

Department	Article	Article in anthology	Publication type		Total	WoS coverage
			Monograph	Conference paper		
Immunology, Genetics and Pathology	954,1 (3258)	14,4 (27)	0,0 (0)	4,0 (12)	972,5 (3297)	95,7
Medical Biochemistry and Microbiology	547,1 (1623)	8,3 (19)	0,3 (1)	0,3 (3)	555,9 (1646)	95,6
Medical Cell Biology	307,7 (776)	5,9 (27)	0,0 (0)	1,4 (3)	315,1 (806)	97,1
Medical Sciences	1943,8 (7051)	30,1 (45)	2,8 (5)	10,1 (25)	1986,8 (7126)	92,3
Public Health and Caring Sciences	908,3 (2636)	63,1 (95)	5,9 (9)	8,7 (22)	985,9 (2762)	83,7
Surgical Sciences	1745,3 (4912)	68,8 (132)	2,0 (2)	18,2 (43)	1834,3 (5089)	89,3
Women's and Children's Health	1076,7 (2969)	37,2 (49)	2,9 (5)	5,9 (17)	1122,7 (3040)	90,2

Table 24. Faculty of Pharmacy. Publication volume by publication type, and WoS coverage (in %). Publication period: 2014-2022.

Department	Article	Article in anthology	Publication type		Total	WoS coverage
			Monograph	Conference paper		
Medicinal Chemistry	299,0 (922)	7,3 (10)	0,0 (0)	0,0 (0)	306,3 (932)	95,3
Pharmaceutical Biosciences	440,5 (1155)	10,4 (13)	0,0 (0)	7,4 (15)	458,3 (1183)	94,3
Pharmacy	239,0 (600)	3,2 (5)	0,0 (0)	0,3 (1)	242,5 (606)	95,6

3.3.1 Publishing Volume and Publishing Level – The Norwegian Model

Faculty of Medicine

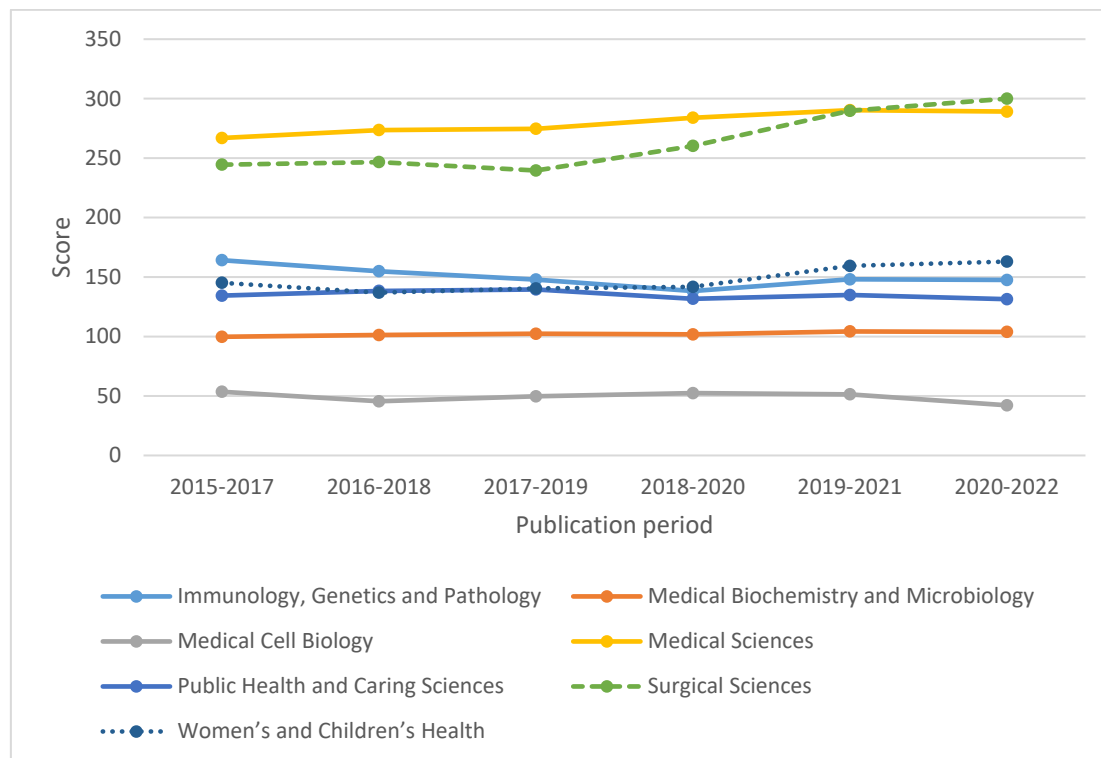


Figure 28. Faculty of Medicine. Norwegian score by publication period. 3-year moving average.

Table 25. Faculty of Medicine. Proportion (in %) publication fractions at level 2 relative to the sum of publication fractions across levels 1 and 2 (given within parentheses) by publication period. 3-year moving average.

Department	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021	2020-2022
Immunology, Genetics and Pathology	24,5 (332,2)	26,0 (306,3)	26,2 (291,6)	23,2 (283,6)	22,6 (306,2)	22,2 (307,2)
Medical Biochemistry and Microbiology	35,1 (176,1)	33,8 (181,7)	32,6 (186,2)	30,2 (190,8)	31,5 (192,3)	29,8 (195,5)
Medical Cell Biology	19,4 (116,2)	19,1 (98,9)	23,7 (101,1)	28,8 (100,1)	27,2 (100,3)	25,5 (84,4)
Medical Sciences	15,0 (618,3)	15,3 (627,9)	16,0 (623,3)	16,2 (639,6)	16,5 (654,2)	16,5 (649,8)
Public Health and Caring Sciences	16,5 (314,5)	17,5 (312,4)	18,4 (309,7)	17,6 (293,1)	17,4 (302,8)	14,5 (306,3)
Surgical Sciences	17,4 (547,2)	16,6 (558,9)	15,1 (556,6)	18,6 (573,5)	20,7 (621,2)	22,3 (627,5)
Women's and Children's Health	11,3 (356,5)	11,8 (333,8)	12,3 (340,0)	14,0 (334,3)	13,5 (379,6)	12,5 (394)

Faculty of Pharmacy

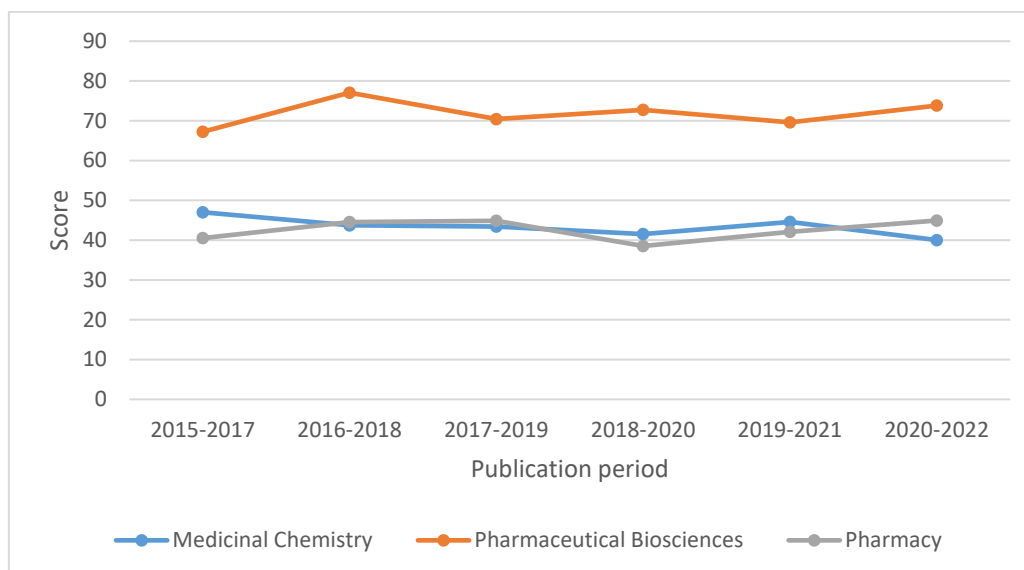


Figure 29. Faculty of Pharmacy. Norwegian score by publication period. 3-year moving average.

Table 26. Faculty of Pharmacy. Proportion (in %) publication fractions at level 2 relative to the sum of publication fractions across levels 1 and 2 (given within parentheses) by publication period. 3-year moving average.

Department	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021	2020-2022
Medicinal Chemistry	19,2 (102,7)	19,4 (95,2)	18,3 (95,5)	16,4 (94,1)	17,6 (99,1)	17,1 (89,5)
Pharmaceutical Biosciences	20,3 (144,0)	22,3 (160,0)	22,4 (145,8)	24,6 (146,4)	23,9 (141,3)	22,8 (152,1)
Pharmacy	29,4 (76,6)	32,7 (80,8)	31,6 (82,5)	29,8 (72,5)	33 (76,2)	32,1 (82,2)

3.3.2 Field Normalized Citation Impact

In each graph in this section, the label of the vertical axis that corresponds to the world average for the citation indicator of the graph is in green color.

Faculty of Medicine

Table 27. Faculty of Medicine. Publication fractions (P; full counts within parentheses), MNCS, PP(top 10%), MNJS and MJPP(top10%) for the whole publication period 2014-2021.

Department	P	Indicator			
		MNCS	PP(top 10%)	MNJS	MJPP(top 10%)
Immunology, Genetics and Pathology	624,9 (2728)	1,34	14,1	1,31	13,5
Medical Biochemistry and Microbiology	348,0 (1291)	1,45	16,6	1,43	16,1
Medical Cell Biology	241,5 (644)	1,02	10,8	1,07	11,3
Medical Sciences	1351,7 (5613)	1,04	9,6	1,10	11,0
Public Health and Caring Sciences	567,4 (1991)	0,95	8,6	0,98	9,5
Surgical Sciences	1194,2 (3716)	1,03	9,6	1,12	11,2
Women's and Children's Health	728,7 (2289)	0,86	7,1	0,94	8,8

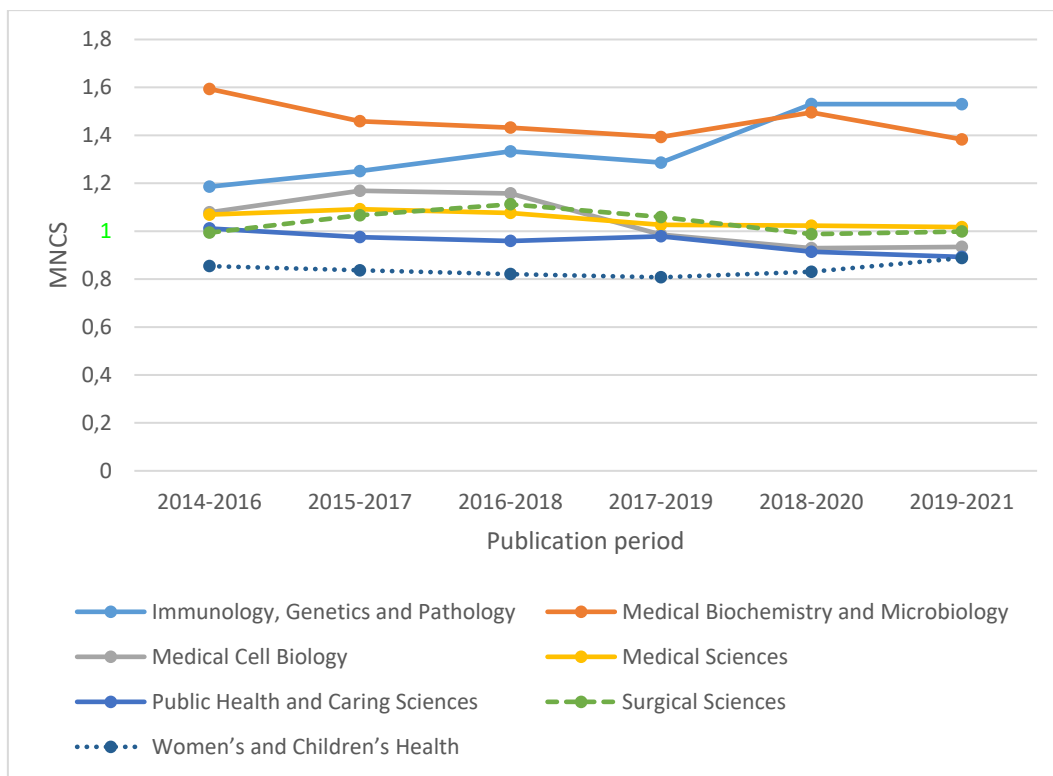


Figure 30. Faculty of Medicine. MNCS by publication period. 3-year moving average.

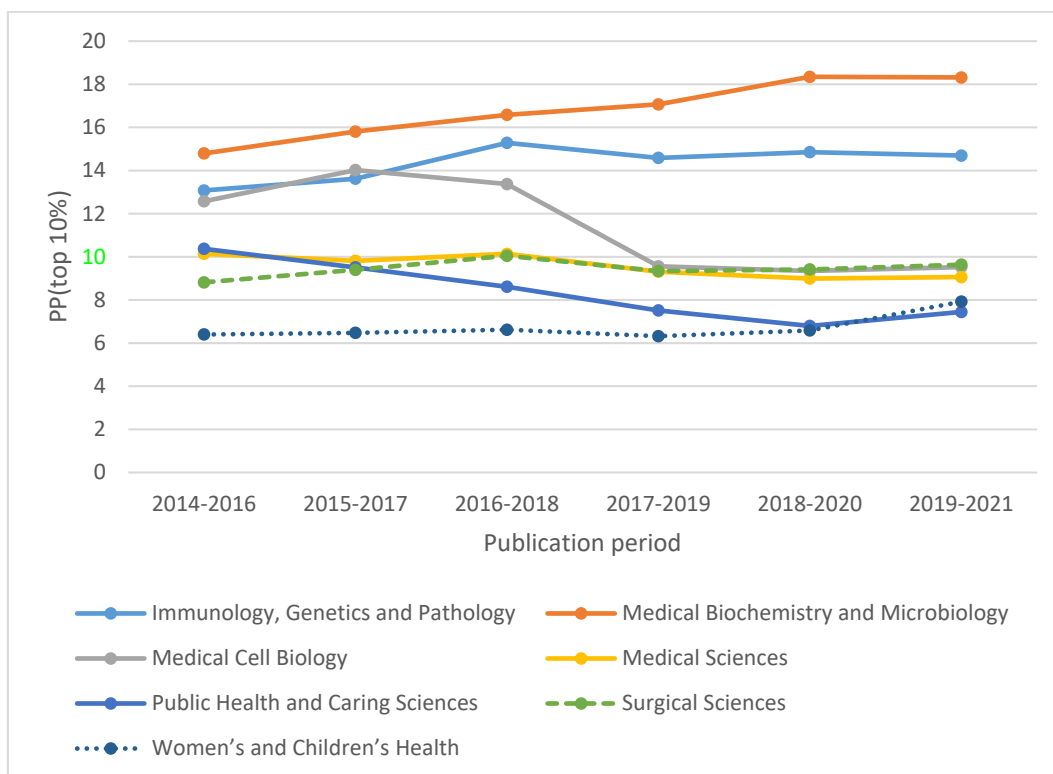


Figure 31. Faculty of Medicine. PP(top 10%) by publication period. 3-year moving average.

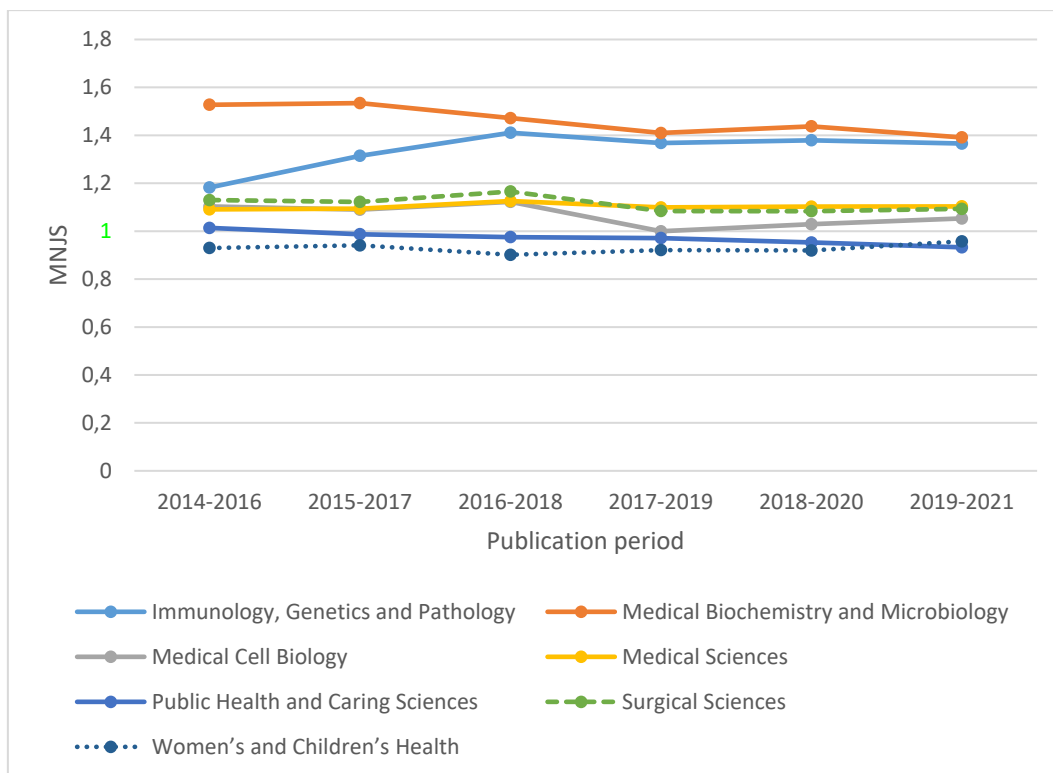


Figure 32. Faculty of Medicine. MNJS by publication period. 3-year moving average.

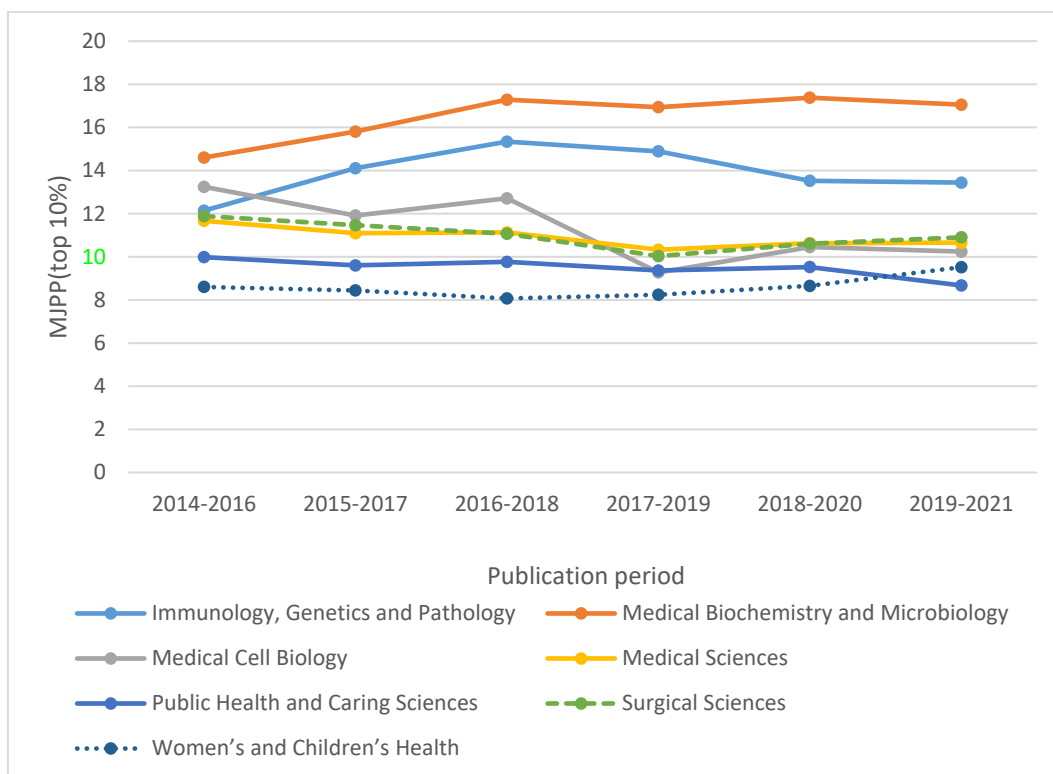


Figure 33. Faculty of Medicine. MJPP(top 10%) by publication period. 3-year moving average.

Faculty of Pharmacy

Table 28. Faculty of Pharmacy. Publication fractions (P; full counts within parentheses), MNCS, PP(top 10%), MNJS and MJPP(top10%) for the whole publication period 2014-2021.

Department	Indicator				
	P	MNCS	PP(top 10%)	MNJS	MJPP(top 10%)
Medicinal Chemistry	219,9 (754)	0,93	9,5	0,94	8,1
Pharmaceutical Biosciences	320,1 (901)	0,84	6,0	0,98	9,2
Pharmacy	171,8 (443)	1,26	12,8	1,28	13,7

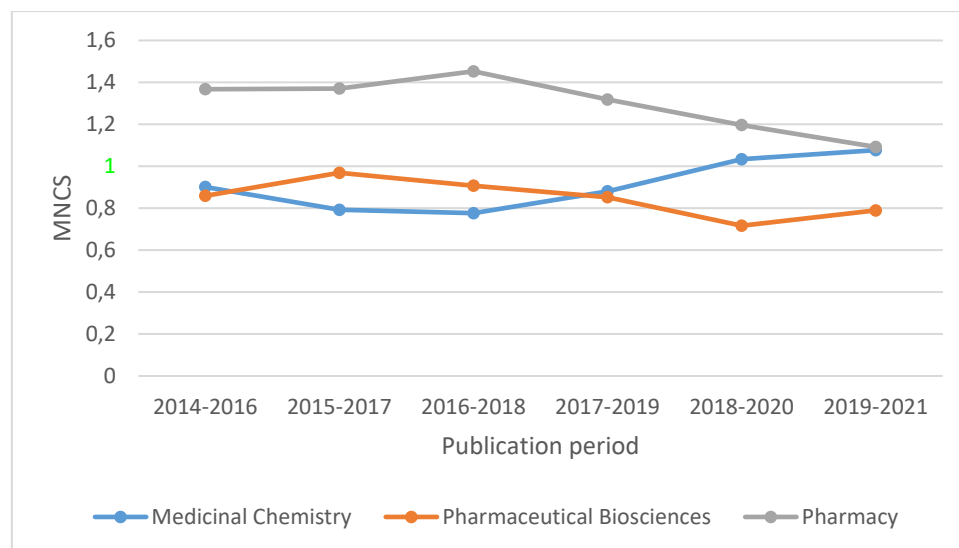


Figure 34. Faculty of Pharmacy. MNCS by publication period. 3-year moving average.

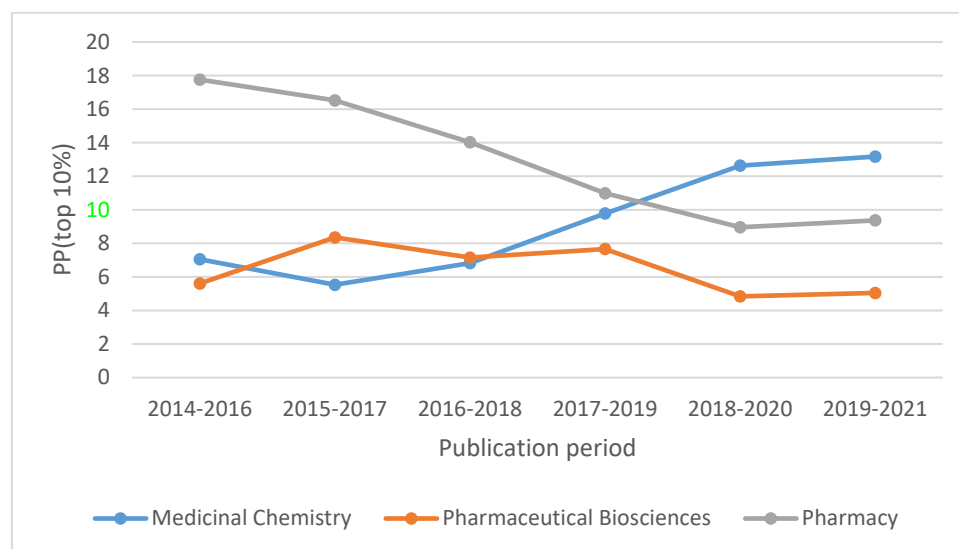


Figure 35. Faculty of Pharmacy. PP(top 10%) by publication period. 3-year moving average.

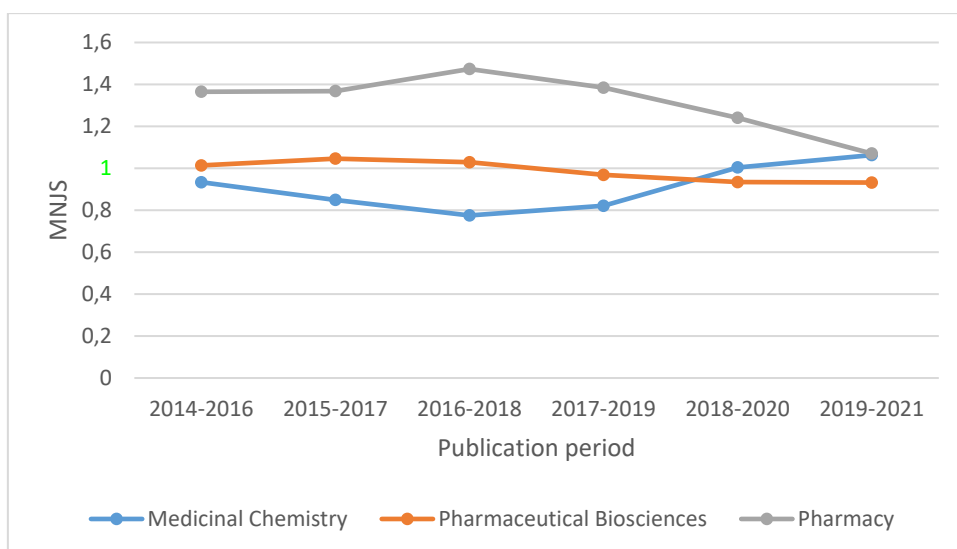


Figure 36. Faculty of Pharmacy. MNJS by publication period. 3-year moving average.

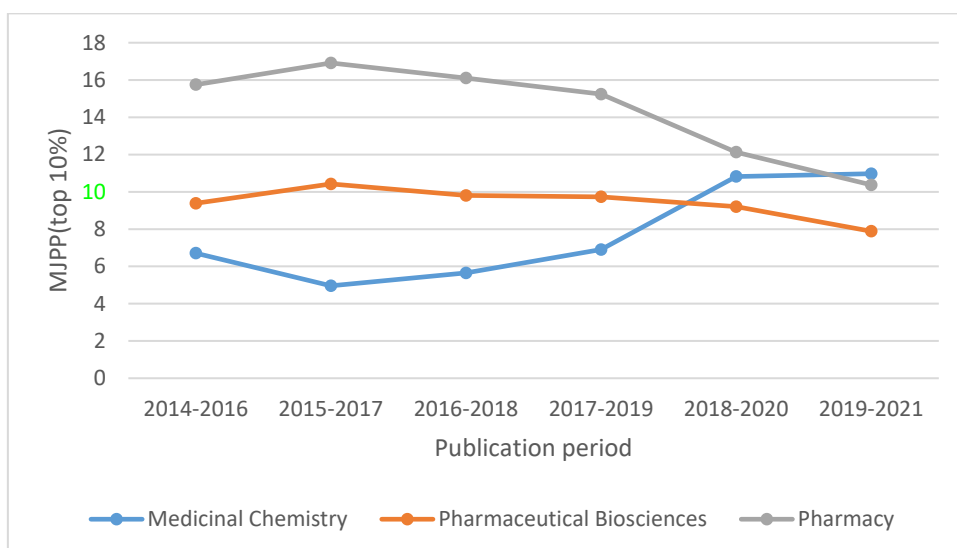


Figure 37. Faculty of Pharmacy. MJPP(top 10%) by publication period. 3-year moving average.

3.3.3 Collaboration

For all tables in this section, PP(int collab) and PP(industry) are given as percentages.

Faculty of Medicine

Table 29. Faculty of Medicine. Publications (P, full counts), PP(int collab) and PP(industry) for the whole publication period 2014-2021.

Department	Indicator		
	P	PP(int collab)	PP(industry)
Immunology, Genetics and Pathology	2728	63,7	12,0
Medical Biochemistry and Microbiology	1291	72,5	6,3
Medical Cell Biology	644	52,8	7,8
Medical Sciences	5613	56,6	15,0
Public Health and Caring Sciences	1991	49,6	9,7
Surgical Sciences	3716	53,9	9,3
Women's and Children's Health	2289	54,3	5,0

Table 30. Faculty of Medicine. PP(int collab) and PP(industry) (within parentheses) by publication period. 3-year moving average.

Department	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021
Immunology, Genetics and Pathology	60,9 (12,2)	62,6 (12,7)	63,7 (13,6)	63,2 (13,0)	66,3 (11,9)	67,8 (11,0)
Medical Biochemistry and Microbiology	66,5 (6,8)	66,9 (5,7)	69,5 (6,0)	73,3 (6,0)	76,3 (6,2)	78,6 (6,3)
Medical Cell Biology	48,0 (2,7)	50,2 (4,7)	54,9 (9,2)	53,8 (12,7)	55,6 (11,5)	55,6 (9,1)
Medical Sciences	53,6 (15,8)	55,5 (14,9)	57,6 (15,4)	58,1 (15,6)	59,1 (14,9)	58,5 (14,4)
Public Health and Caring Sciences	47,4 (9,9)	45,6 (9,4)	49,7 (10,2)	51,4 (10,2)	53,1 (9,5)	51,0 (8,9)
Surgical Sciences	48,4 (10,4)	51,5 (10,3)	51,9 (9,9)	52,5 (9,5)	54,8 (8,2)	58,7 (8,1)
Women's and Children's Health	47,8 (6,1)	49,6 (5,1)	51,1 (3,8)	53,6 (4,4)	57,4 (4,6)	60,3 (5,0)

Faculty of Pharmacy

Table 31. Faculty of Pharmacy. Publications (P, full counts), PP(int collab) and PP(industry) for the whole publication period 2014-2021.

Department	Indicator		
	P	PP(int collab)	PP(industry)
Medicinal Chemistry	754	59,4	16,1
Pharmaceutical Biosciences	901	62,1	24,9
Pharmacy	443	61,2	33,4

Table 32. Faculty of Pharmacy. PP(int collab) and PP(industry) (within parentheses) by publication period. 3-year moving average.

Department	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021
Medicinal Chemistry	45,2 (15,8)	49,6 (14,0)	52,2 (16,0)	56,2 (16,1)	67,4 (15,2)	71,5 (15,7)
Pharmaceutical Biosciences	61,3 (26,6)	59,0 (25,7)	61,2 (24,5)	61,6 (25,2)	63,3 (26,1)	63,6 (23,5)
Pharmacy	58,7 (34,0)	59,2 (36,5)	61,7 (38,9)	58,7 (37,7)	58 (31,5)	63,6 (28,7)

3.3.4 Open Access

For all figures in this section, proportion OA publications is given as a percentage. Total OA is defined as publications belonging to any type of OA (gold, hybrid or green).

Faculty of Medicine

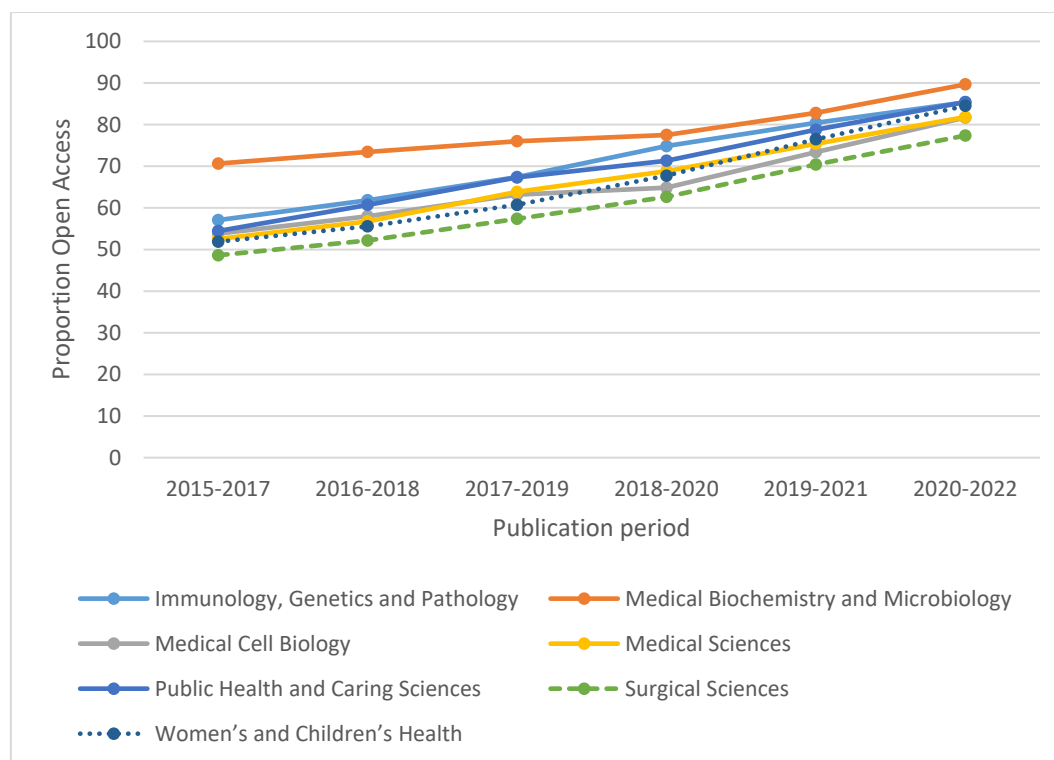


Figure 38. Faculty of Medicine. Total OA by publication period. 3-year moving average.

Faculty of Pharmacy

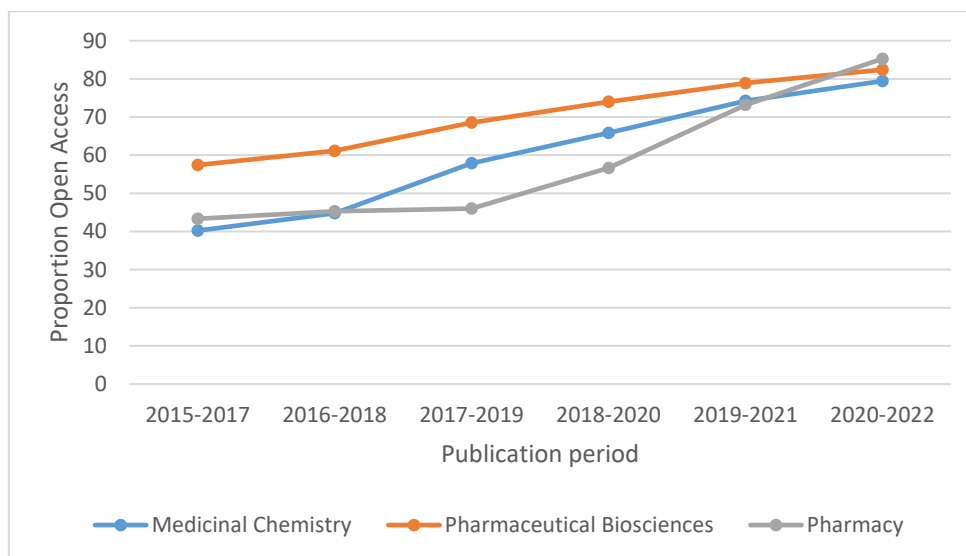


Figure 39. Faculty of Pharmacy. Total OA by publication period. 3-year moving average.

3.4 Teknat

The number of Teknat departments included in ABM is 12. Table 33 reports publication volume, fractional counts and full counts (within parentheses) by department and publication type, and WoS coverage. WoS coverage concerns the number of WoS publications of the four types represented in the table relative to all publications of these types for the department.

Table 33. Faculty of Science and Technology. Publication volume by publication type, and WoS coverage (in %). Publication period: 2014-2022.

Department	Publication type				Total	WoS coverage
	Article	Article in anthology	Monograph	Conference paper		
Cell and Molecular Biology	494,9 (1229)	15,3 (20)	0,7 (1)	1,8 (8)	512,7 (1258)	96,3
Chemistry - BMC	329,9 (930)	7,6 (15)	0,0 (0)	1,3 (4)	338,8 (949)	96,1
Chemistry - Ångström Laboratory	1101,2 (2359)	34,1 (58)	5,5 (7)	10,9 (28)	1151,7 (2452)	94,0
Civil and Industrial Engineering	178,8 (319)	33,5 (48)	15,5 (20)	94,9 (133)	322,7 (520)	49,6
Earth Sciences	895,8 (2274)	29,6 (61)	2,2 (5)	61,7 (109)	989,2 (2449)	85,9
Ecology and Genetics	757,0 (1962)	13,2 (27)	4,3 (5)	1,0 (1)	775,4 (1995)	94,3
Electrical Engineering	518,0 (987)	5,4 (12)	0,5 (1)	211,5 (369)	735,3 (1369)	79,2
Information Technology	651,6 (1379)	59,6 (86)	7,4 (12)	766,6 (1289)	1485,3 (2766)	72,8
Materials Science and Engineering	949,9 (1974)	25,8 (36)	3,7 (8)	123,6 (214)	1103,1 (2232)	84,2
Mathematics	539,0 (905)	7,3 (9)	4,5 (5)	7,2 (17)	558,0 (936)	93,1
Organismal Biology	375,7 (1036)	26,2 (33)	2,5 (3)	3,1 (5)	407,5 (1077)	86,6
Physics and Astronomy	3065,5 (6850)	20,9 (29)	6,7 (8)	187,7 (379)	3280,8 (7266)	95,1

3.4.1 Publishing Volume and Publishing Level – The Norwegian Model

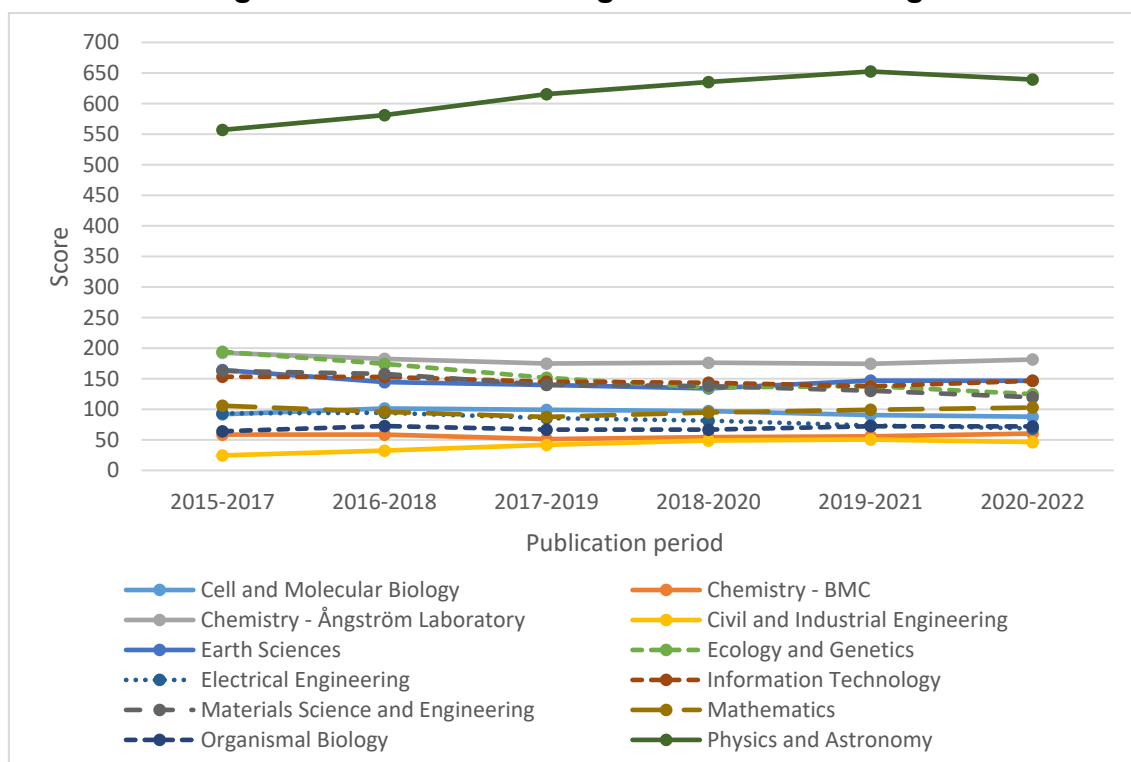


Figure 40. Faculty of Science and Technology. Norwegian score by publication period. 3-year moving average.

Table 34. Faculty of Science and Technology. Proportion (in %) publication fractions at level 2 relative to the sum of publication fractions across levels 1 and 2 (given within parentheses) by publication period. 3-year moving average.

Department	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021	2020-2022
Cell and Molecular Biology	32,8 (166,7)	31,7 (187,0)	30,5 (185,3)	30,1 (183,0)	37,7 (155,2)	41,7 (144,1)
Chemistry-BMC	31,1 (108,6)	29,3 (111,3)	26,9 (100,5)	29,4 (103,5)	31,6 (102,9)	36,2 (105,3)
Chemistry - Ångström Laboratory	29,8 (355,9)	25,4 (354,9)	21,8 (360,9)	20,7 (371,7)	22,6 (362,6)	28,5 (348,5)
Civil and Industrial Engineering	31,9 (53,8)	31,0 (65,6)	28,4 (77)	24,2 (93,3)	25,4 (96,2)	26,6 (90,8)
Earth Sciences	28,6 (314,5)	26,7 (285,1)	26,3 (280,3)	26,7 (268,4)	25,6 (298,5)	24,7 (299,2)
Ecology and Genetics	46,7 (303,4)	44,2 (280,0)	40,5 (252,7)	37,9 (231,6)	42,9 (224,3)	46,3 (195,9)
Electrical Engineering	23,2 (191,2)	25,2 (188,3)	24,0 (174,3)	23,0 (168,9)	20,3 (158,7)	15,0 (160,2)
Information Technology	18,2 (348,8)	18,9 (339,6)	16,8 (333,2)	18,7 (320,3)	20,4 (302,1)	21,6 (307,2)
Materials Science and Engineering	23,6 (329,1)	22,7 (320,5)	17,2 (310,2)	15,9 (311,1)	13,7 (304,6)	15,4 (272,2)
Mathematics	34,5 (188,1)	35,4 (168,5)	31,1 (161,8)	37,2 (163,1)	37,9 (169,4)	36,2 (177,0)
Organismal Biology	25,4 (128,4)	30,7 (135,7)	31,7 (123,0)	32,5 (121,4)	36,3 (125,9)	39,0 (121,8)
Physics and Astronomy	30,6 (1043,8)	29,1 (1105,2)	30,0 (1155,0)	36,3 (1104,3)	41,8 (1063,8)	47,8 (978,6)

3.4.2 Field Normalized Citation Impact

In each graph in this section, the label of the vertical axis that corresponds to the world average for the citation indicator of the graph is in green color.

Table 35. Faculty of Science and Technology. Publication fractions (P; full counts within parentheses), MNCS, PP(top 10%), MNJS and MJPP(top10%) for the whole publication period 2014-2021.

Department	Indicator				
	P	MNCS	PP(top 10%)	MNJS	MJPP(top 10%)
Cell and Molecular Biology	350,4 (1065)	1,19	11,7	1,27	13,1
Chemistry - BMC	256,8 (784)	1,24	14,4	1,24	12,8
Chemistry - Ångström Laboratory	874,7 (1975)	1,07	10,4	1,12	11,4
Civil and Industrial Engineering	97,3 (185)	1,16	9,4	1,11	12,5
Earth Sciences	588 (1769)	0,97	8,0	1,07	10,2
Ecology and Genetics	570,5 (1712)	1,64	18,8	1,55	17,7
Electrical Engineering	380,9 (777)	0,83	7,4	1,02	9,6
Information Technology	416,1 (969)	1,01	10,5	1,07	10,6
Materials Science and Engineering	731,8 (1607)	0,95	7,1	1,10	10,1
Mathematics	390,0 (709)	1,11	12,7	1,01	9,9
Organismal Biology	262,0 (860)	1,78	17,2	1,65	15,3
Physics and Astronomy	1310,0 (5902)	1,04	9,6	1,04	9,9

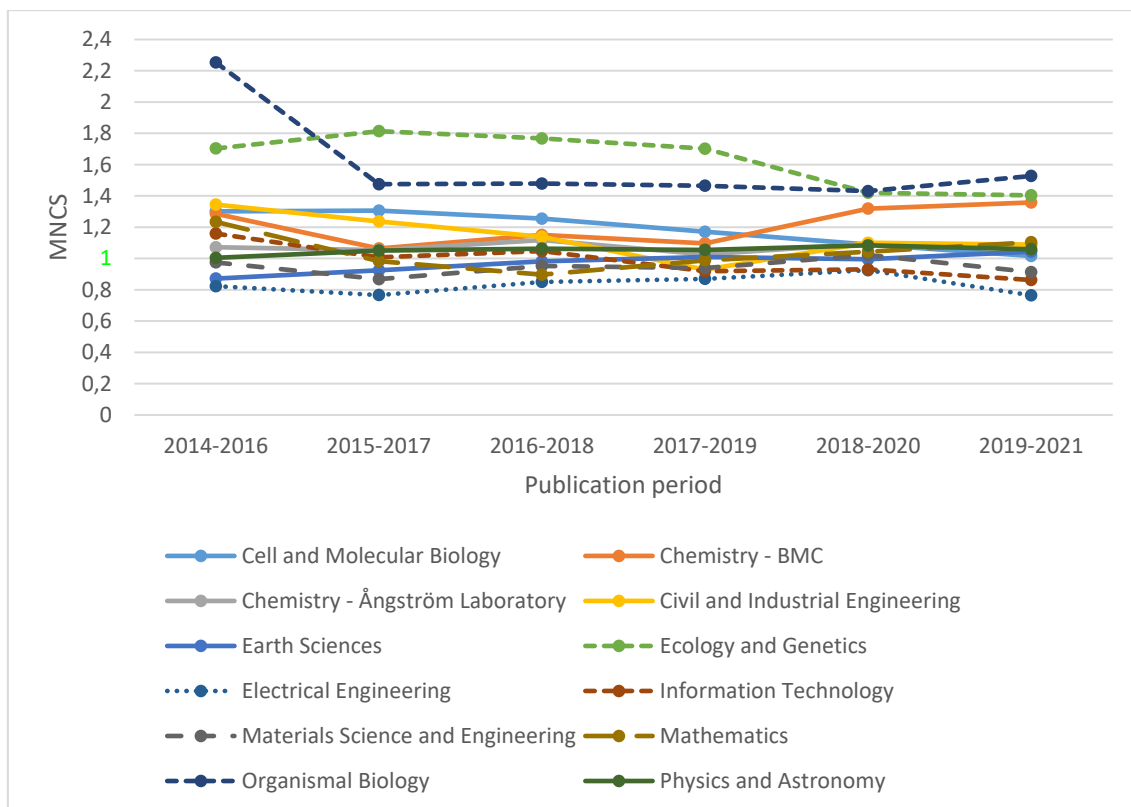


Figure 41. Faculty of Science and Technology. MNCS by publication period. 3-year moving average.

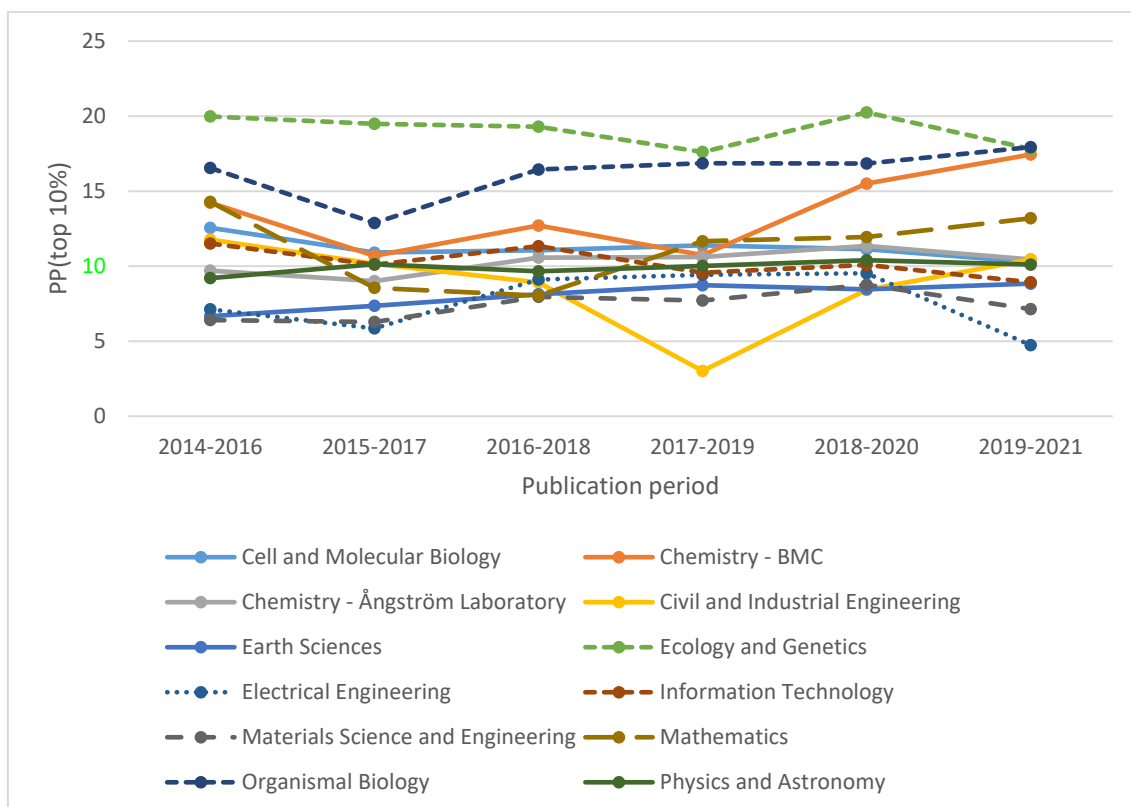


Figure 42. Faculty of Science and Technology. PP(top 10%) by publication period. 3-year moving average.

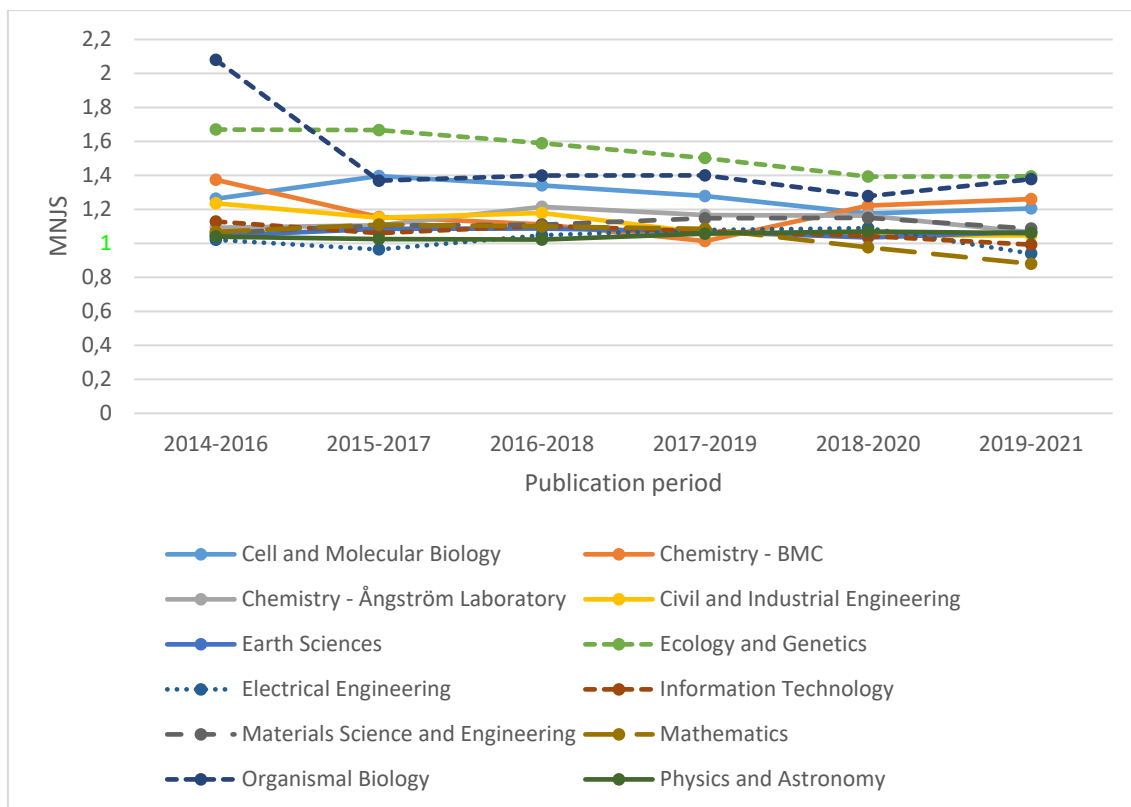


Figure 43. Faculty of Science and Technology. MNJS by publication period. 3-year moving average.

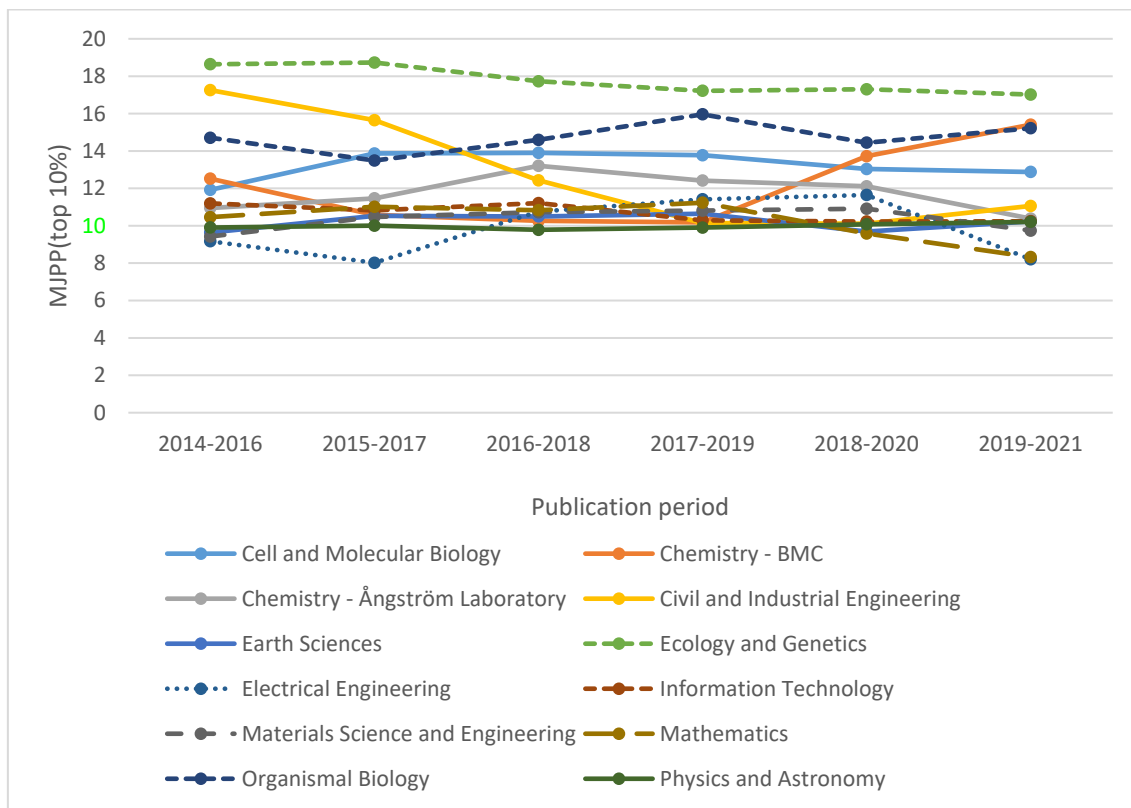


Figure 44. Faculty of Science and Technology. MJPP(top 10%) by publication period. 3-year moving average.

3.4.3 Collaboration

For all tables in this section, PP(int collab) and PP(industry) are given as percentages.

Table 36. Faculty of Science and Technology. Publications (P, full counts), PP(int collab) and PP(industry) for the whole publication period 2014-2021.

Department	Indicator		
	P	PP(int collab)	PP(industry)
Cell and Molecular Biology	1065	71,3	7,7
Chemistry - BMC	784	62,9	11,4
Chemistry - Ångström Laboratory	1975	66,5	6,2
Civil and Industrial Engineering	185	42,7	3,8
Earth Sciences	1769	81,1	7,7
Ecology and Genetics	1712	80,5	6,1
Electrical Engineering	777	58,5	12,7
Information Technology	969	62,3	8,5
Materials Science and Engineering	1607	58,0	10,4
Mathematics	709	62,8	1,7
Organismal Biology	860	79,0	3,9
Physics and Astronomy	5902	88,8	10,7

Table 37. Faculty of Science and Technology. PP(int collab) and PP(industry) (within parentheses) by publication period. 3-year moving average.

Department	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021
Cell and Molecular Biology	68,0 (7,1)	68,3 (6,4)	69,9 (6,8)	72,7 (7,6)	73,9 (8,6)	74,0 (9,8)
Chemistry - BMC	52,9 (11,0)	56,8 (11,3)	61,1 (14,5)	65,7 (11,7)	70,5 (11,6)	73,8 (10,5)
Chemistry - Ångström Laboratory	60,4 (4,8)	61,3 (5,1)	63,9 (6,7)	66,6 (6,9)	69,7 (7,2)	73,0 (6,7)
Civil and Industrial Engineering	38,6 (0,0)	37,2 (0,0)	33,9 (3,6)	37,5 (6,2)	43,0 (7,0)	48,0 (5,0)
Earth Sciences	79,6 (7,6)	80,9 (7,7)	81,2 (9,2)	81,5 (8,9)	82,9 (8,3)	83,1 (7,2)
Ecology and Genetics	76,4 (5,4)	78,4 (5,3)	80,4 (6,4)	82,0 (6,3)	82,7 (7,0)	84,0 (6,4)
Electrical Engineering	52,6 (11,9)	54,5 (11,3)	54,4 (13,5)	61,2 (14,7)	62,5 (15,4)	66,1 (13,1)
Information Technology	60,1 (6,5)	59,6 (9,1)	63,1 (9,5)	64,7 (8,7)	66,0 (7,6)	62,6 (9,4)
Materials Science and Engineering	51,4 (12,2)	55,7 (11,4)	58,7 (10,3)	60,3 (10,1)	62,2 (9,5)	62,9 (9,3)
Mathematics	59,1 (2,1)	61,9 (2,0)	62,8 (2,2)	65,6 (2,0)	62,7 (1,7)	64 (0,8)
Organismal Biology	73,9 (3,4)	77,8 (3,5)	79,3 (4,0)	79,0 (3,3)	78,6 (3,8)	82,5 (4,4)
Physics and Astronomy	88,4 (10,1)	88,1 (14,2)	88,4 (16,6)	88,8 (15,6)	89,4 (11,3)	89,7 (6,7)

3.4.4. Open Access

In Figure 45, proportion OA publications is given as a percentage. Total OA is defined as publications belonging to any type of OA (gold, hybrid or green).

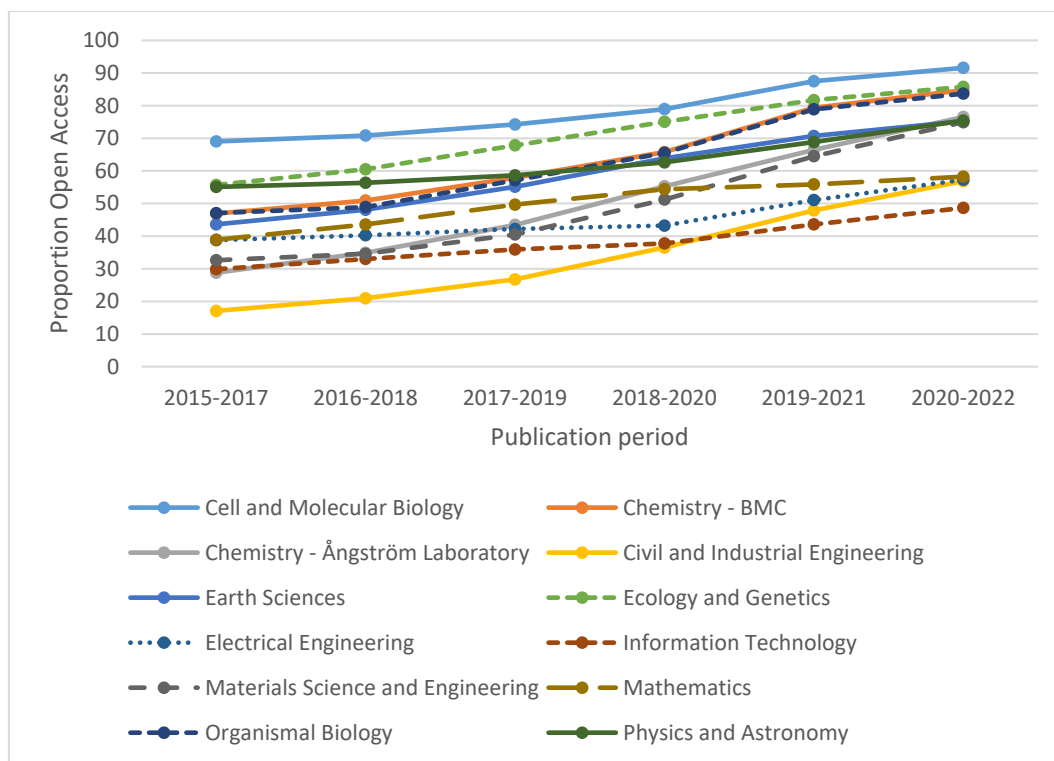


Figure 45. Faculty of Science and Technology. Total OA by publication period. 3-year moving average.

4 Brief summary of the results

Humsam

Regarding the Norwegian model, the increase in proportion of publication fractions at level 2 for some departments in the *Faculty of Arts* is quite high (Table 7). *Philosophy* has an increase of about 18 percentage units from the publication period 2015-2017 to the period 2020-2022, whereas *Gender Research* has an increase of about 15 percentage units. In the *Faculty of Languages*, *Modern Languages* has an increase of about 7 percentage units for the same periods (Table 9). Three Humsam departments have observed values greater than 50% with regard to the last considered publication period (2020-2022): *Philosophy* (62,1%), *Economics* (58,6%), and *Musicology* (53,3%).

When it comes to citation indicators, *Peace and Conflict Studies* is worth mentioning, since the department has very high figures for all four indicators with respect to the whole publication period, in particular for the two publication-level indicators, MNCS and PP(top 10%) (Table 14). The PP(top 10 %) value is as high as 26,4%. For this indicator, other Humsam departments with high values for the whole publication period are *Economics* (16,4%), *Linguistics and Philology* (15%), *Human Geography* (14,6%), *Housing and Urban Research* (14,6%), and *Archaeology and Ancient History* (12,9%).

In general, the Humsam departments/faculties have an increasing trend for proportion OA. The extreme OA trend for *Game Design* in the *Faculty of Arts* is mostly explained by a two-year period (2015-2016) with quite many book chapters made freely available.

Medfarm

Regarding the *Faculty of Medicine*, the highest values on the citation indicators, with respect to the whole publication period, are observed for the two departments *Medical Biochemistry and Microbiology* and *Immunology, Genetics and Pathology* (Table 27). *Medical Biochemistry and Microbiology* has the highest PP(top 10%) value for the last considered period (18,3%), followed by *Immunology, Genetics and Pathology* (14,7%) (Figure 31). The former department has the highest proportion of publication fractions at level 2 for all six considered periods (Table 25). In general, the departments of the faculty have an increasing trend for proportion OA (Figure 38).

For the *Faculty of Pharmacy*, *Pharmacy* has high values on the PP(top 10%) indicator in the first three publication periods (Figure 35). However, *Pharmacy* has a decreasing PP(top 10%) trend across the six periods, whereas the opposite is the case for *Medicinal Chemistry*. In the last period, the latter department has a PP(top 10%) value of 13,2%. *Pharmacy* has high values of the collaboration indicator PP(industry), even if a decreasing trend can be observed from the period 2016-2018 to the last period (Table 32). The departments of the faculty have an increasing trend for proportion OA (Figure 39).

Teknat

For the *Faculty of Science and Technology*, the four departments *Cell and Molecular Biology*, *Chemistry – BMC*, *Ecology and Genetics*, and *Organismal Biology* all have high values on the citation indicators with respect to the whole publication period (Table 35). For the last considered period, *Ecology and Genetics*, *Organismal Biology*, and *Chemistry – BMC* have the three highest PP(top 10%) values (between 17% and 18%), followed by *Mathematics*, 13,2% (Figure 42). With regard to the Norwegian model, *Physics and Astronomy*, *Ecology and Genetics*, *Cell and Molecular Biology*, and *Organismal Biology* show the highest figures with regard to proportion of publication fractions at level 2 for the last considered period (Table 34).

High values are observed on the international collaboration indicator, PP(int collab), for the four departments *Earth Sciences*, *Ecology and Genetics*, *Organismal Biology* and *Physics and Astronomy* (Tables 36 and 37).

The overall trend for proportion OA is increasing for the entire faculty.

5 Concluding remarks

In this report, we have described the data and methods used in UU ABM 2023, and we have reported results on publication volume, publishing level, citation impact, collaboration (in terms of co-publishing) and OA. For the measurement of citation impact, four advanced bibliometric indicators were used.

We believe that the results of ABM are of interest, not only for the university management, but also for the heads of the departments of UU. However, bibliometric statistics should be interpreted with great caution when underlying publication sets are small. For some of the departments covered by ABM, this is the case.

In our view, and as is pointed out in the Leiden Manifesto for research metrics (Hicks et al., 2015), bibliometric statistics should support peer review assessments, not replace such assessments. The use of bibliometric statistics can indeed strengthen peer review, since such statistics can be used to question bias tendencies in peer review. As is also pointed out by the Leiden Manifesto for research metrics, variation by field in publication and citation practices should be controlled for in bibliometric research evaluation. In UU ABM 2023, and with respect to citation impact, this principle is taken into account.

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Appendix 1 Formal definitions of citation indicators used in UU ABM

In this appendix, we describe the calculation of the four field normalized citation impact indicators used in UU ABM.

The following indicators are defined in this appendix:

- Mean normalized number of citations per publication (MNCS).
- Proportion of frequently cited publications (top 10%) (PP(top 10%)).
- Mean normalized journal impact score per publication (MNJS).
- Mean journal proportion of top 10% publications (MJPP(top 10%)).

MNCS and PP(top 10%) are publication-level indicators, whereas MNJS and MJPP(top 10%) are journal-level indicators.

Regardless of indicator, a subject classification of publications is used for field normalization purposes. The classification is generated by application of an advanced clustering methodology, in which a publication-publication relatedness measure based on direct citations between publications is utilized (Waltman & van Eck, 2012). The classification, which contains about 4,000 classes, is such that each publication belongs to exactly one class.¹¹ The classification has been created by CWTS, Leiden University, Netherlands.

This appendix treats the case, in which fractional counts are used in the calculations of indicator values. In case whole counts should be used in the calculations, a_i in Eq. (1) below is set to 1.

¹¹ Cf. footnote 4 in this report.

Let A be a unit of analysis, and n the number of publications for A . Let r_i be the number of authors of the i th publication for A . Let a_i be the *author fraction* A has of the i th publication. We consider two cases.

(a) A is a department. a_i is then defined as

$$a_i = \sum_{j=1}^{m_i} \frac{uuaff_j}{totaff_j} \times \frac{1}{d_j} \times \frac{1}{r_i} \quad (1)$$

where m_i is the number of authors affiliated to A regarding the i th publication, d_j the number of UU department affiliations of the j th of these A authors, $uuaff_j$ the number of UU affiliations listed in WoS for the j th author, and $totaff_j$ the total number of affiliations listed in WoS for the j th author. Note that the right-hand side in Eq. (1) is equal to m_i/r_i when each A author has exactly one affiliation in the i th publication.¹²

(b) A is an individual author. a_i is in this case defined as $1/r_i$.

We define MNCS for A , $MNCS(A)$, as

$$MNCS(A) = \frac{\sum_{i=1}^n a_i NCS_i}{\sum_{i=1}^n a_i} \quad (2)$$

$$NCS_i = c_i / \mu_{sc_i}$$

$$\mu_{sc_i} = \frac{1}{k_i} \sum_{j=1}^{k_i} c_j$$

where NCS_i is the normalized citation score for the i th publication of A , c_i is the citation score of the i th publication, sc_i the subject class to which the i th publication has been (algorithmically) assigned, k_i the number of publications in sc_i with the same publication year as the i th publication, and c_j the citation score of the j th publication among these latter publications. μ_{sc_i} is the field reference value that c_i is normalized against. The normalization gives rise to a normalized citation score for the i th publication. Clearly, $MNCS(A)$ is a weighted mean across the publications of A , a fact that also holds for the other three citation indicators treated in this report (Section 2.2).

We define PP(top 10%) for A , $PP(\text{top } 10\%)(A)$, as

$$PP(\text{top } 10\%)(A) = \frac{\sum_{i=1}^n a_i b_i}{\sum_{i=1}^n a_i} \quad (3)$$

$$b_i = \frac{\max(y_{sc_i}^{c_i+1} - \max(0.9, y_{sc_i}^{c_i}), 0)}{y_{sc_i}^{c_i+1} - y_{sc_i}^{c_i}}$$

where $y_{sc_i}^{c_i}$ ($y_{sc_i}^{c_i+1}$) is the proportion publications—with respect to the citation distribution, which concerns the publications in sc_i with the same publication year as the i th publication of A —with less than c_i ($c_i + 1$) citations. $\max(y_{sc_i}^{c_i+1} - \max(0.9, y_{sc_i}^{c_i}), 0) / y_{sc_i}^{c_i+1} - y_{sc_i}^{c_i}$ is the fraction of the i th publication with which the publication is assigned to the 10% most frequently cited publications (Waltman & Schreiber, 2013).

¹² The data source we use with respect to the Norwegian model, i.e. DiVA/GLIS, has typically not information on the total number of affiliations listed in WoS for an author that is affiliated to UU in a publication covered by WoS. Therefore, the leftmost factor in Eq. (1) is dropped regarding author fractionalization and the Norwegian model.

We define MNJS for A, MNJS(A), as

$$\text{MNJS}(A) = \frac{\sum_{i=1}^n a_i \text{NJS}_i}{\sum_{i=1}^n a_i} \quad (4)$$

$$\text{NJS}_i = \frac{\sum_{j=1}^{p_i} \text{NCS}_j}{p_i}$$

$$\text{NCS}_j = c_j / \mu_{sc_j}$$

$$\mu_{sc_j} = \frac{1}{k_j} \sum_{l=1}^{k_j} c_l$$

where NJS_i is the normalized journal score of the journal, say J_i , of the i th publication, p_i the number of publications in J_i , NCS_j (c_j) the normalized citation score (citation score) of the j th publication in J_i , say P_j , sc_j the subject class to which P_j has been assigned, k_j the number of publications in sc_j with the same publication year as P_j , and c_l the citation score of the l th of these latter publications. μ_{sc_j} is the field reference value that the citation score of P_j , c_j , is normalized against, and the normalization gives rise to a field normalized citation score for P_j (cf. the definition of MNCS above).

We define the MJPP(top 10%) for A, MJPP(top 10%)(A), as

$$\text{MJPP}(\text{top } 10\%)(A) = \frac{\sum_{i=1}^n a_i \text{JPP}(\text{top } 10\%)_i}{\sum_{i=1}^n a_i} \quad (5)$$

$$\text{JPP}(\text{top } 10\%)_i = \frac{\sum_{j=1}^{q_i} b_j}{q_i}$$

$$b_j = \frac{\max(y_{sc_i}^{c_j+1} - \max(0.9, y_{sc_i}^{c_j}), 0)}{y_{sc_i}^{c_j+1} - y_{sc_i}^{c_j}}$$

where q_i is the number of publications in sc_i with (a) the same publication year as the i th publication of A, and (b) belonging to the journal of the i th publication of A. $\max(y_{sc_i}^{c_j+1} - \max(0.9, y_{sc_i}^{c_j}), 0) / y_{sc_i}^{c_j+1} - y_{sc_i}^{c_j}$ is the fraction of the j th publication, in sc_i and satisfying the conditions (a) and (b), with which the publication is assigned to the 10% most frequently cited publications with respect to the citation distribution determined by sc_i and the publication year of the i th publication of A.

$\text{JPP}(\text{top } 10\%)_i$ is then the extent, on average, to which the publications that belong to sc_i , with the same publication year as the i th publication of A and belonging to the same journal as the i th publication of A, belong to the 10% most frequently cited publications with respect to the citation distribution determined by sc_i and the publication year of the i th publication.

Appendix 2 The Norwegian Model: Publication volume by department and year

Tables A2-1 (Humsam), A2-2 (Medfarm) and A2-3 (Teknat) report publication volume in terms of both fractional counts and full counts (within parentheses) by department and year. Note that volume values are given also for year 2014, a year that is not included in the Norwegian model analysis.

Table A2-1. **Humsam**. Publication volume by department and year.

Department	2014	2015	2016	2017	2018	2019	2020	2021	2022
ALM	20,7 (27)	15,6 (26)	20,3 (31)	23,1 (29)	19 (30)	26,8 (39)	28,3 (44)	19,5 (29)	17,5 (34)
Archaeology and Ancient History	63,3 (69)	66,7 (85)	44,3 (59)	51,8 (71)	58,8 (89)	43,6 (69)	55,4 (72)	40,7 (61)	36 (47)
Art History	19,9 (27)	39,4 (47)	19,2 (22)	22,7 (27)	22,1 (28)	17,9 (24)	17 (22)	24,7 (33)	24,2 (29)
Business Studies	89,2 (124)	93,5 (127)	83,6 (130)	55,6 (81)	69,4 (98)	44,7 (64)	55,1 (95)	43,8 (77)	47,5 (77)
Cultural Anthropology and Ethnology	29,5 (32)	38,1 (45)	33,5 (41)	28,5 (35)	30,8 (38)	37,4 (45)	23,5 (33)	24,9 (29)	17,1 (22)
Economic History	41,8 (51)	30,2 (38)	39,4 (49)	31,2 (41)	36,5 (49)	34,3 (42)	30 (42)	18,2 (24)	22,4 (29)
Economics	21,8 (41)	17,4 (27)	18,6 (36)	17,4 (33)	11,8 (27)	16,2 (34)	21,5 (39)	19,7 (41)	16,3 (35)
English	38,3 (42)	30,3 (33)	30,2 (32)	35,8 (38)	25,3 (28)	22,8 (27)	34 (46)	40,7 (45)	28,1 (33)
Faculty of Education	86,3 (119)	93,8 (138)	75,7 (104)	83,6 (113)	85,1 (123)	84,9 (124)	104,9 (149)	82,2 (118)	78 (109)
Faculty of Law	166,5 (175)	139,7 (157)	166,6 (185)	127,9 (145)	120,9 (133)	138,2 (148)	136 (152)	118 (132)	133,7 (160)
Faculty of Theology	85,7 (90)	80,4 (87)	83,3 (93)	97,5 (113)	74,8 (85)	77,3 (91)	72,4 (83)	83,6 (98)	62,7 (80)
Food Studies, Nutrition and Dietetics	17,1 (21)	12,6 (20)	6,4 (15)	10,9 (26)	15,3 (34)	22,3 (41)	6,8 (27)	7,9 (28)	8,8 (29)
Game Design	17,2 (18)	31,9 (33)	27,2 (29)	1,9 (5)	3,3 (5)	6,4 (11)	3 (5)	5,4 (12)	19,4 (64)
Gender Research	31,5 (42)	23,2 (36)	34,5 (49)	22,9 (28)	31,6 (45)	18 (24)	24,7 (34)	18,8 (31)	12,9 (19)
Government	59,1 (82)	66,6 (82)	96,8 (123)	53,5 (78)	67 (93)	59,5 (85)	60,4 (84)	60,6 (94)	66,1 (94)
History	60,3 (64)	41,9 (50)	41,9 (49)	61,7 (70)	52,7 (58)	37,8 (44)	51,3 (61)	32,8 (38)	40,1 (47)
History of Sciences and Ideas	30 (34)	25,3 (28)	34,1 (36)	24,6 (31)	30,5 (33)	33,7 (39)	28,3 (32)	39 (42)	42,6 (51)
Housing and Urban Research	43,1 (62)	55 (73)	41,1 (66)	36 (59)	41,3 (66)	17,3 (34)	31,2 (56)	26,8 (52)	24,7 (44)
Human Geography	22,7 (32)	26,4 (36)	21,6 (25)	25,7 (39)	35,4 (50)	24,2 (31)	29,6 (44)	32,2 (52)	22,8 (39)
Informatics and Media	35 (50)	28,8 (43)	23,2 (35)	24,7 (33)	40,2 (58)	40,6 (67)	25,4 (37)	27,6 (43)	22,1 (41)
Linguistics and Philology	90,7 (110)	88,1 (105)	74,4 (88)	78,6 (100)	76,7 (101)	77,2 (98)	83,8 (110)	73,1 (96)	84,8 (120)
Literature	55,5 (60)	50 (60)	53,8 (58)	46,7 (54)	36,1 (42)	32,7 (35)	32,8 (38)	32,4 (36)	39,4 (47)
Modern Languages	45 (53)	64,5 (71)	51,5 (54)	43,2 (46)	67 (73)	46,2 (51)	47,7 (54)	45,2 (61)	37 (48)
Musicology	12 (13)	30 (32)	17,5 (18)	26,8 (29)	20 (23)	14 (14)	17,8 (19)	21 (21)	18,9 (23)
Peace and Conflict Studies	54,7 (64)	48,2 (58)	61,3 (78)	40,6 (55)	40,1 (52)	35,8 (47)	34,2 (49)	34,7 (50)	21,8 (35)
Philosophy	43,6 (45)	31,8 (35)	47 (49)	29,3 (33)	41,5 (45)	41,5 (45)	37,9 (42)	40,8 (45)	35,2 (42)

Psychology	38 (74)	48 (88)	55,6 (112)	46 (97)	44,4 (96)	46,7 (102)	38 (103)	44,2 (132)	47,1 (127)
Russian and Eurasian Studies	59,7 (68)	59,2 (67)	52 (60)	29,6 (37)	27,4 (32)	37,4 (45)	24,4 (33)	23,2 (31)	21,5 (35)
Scandinavian Languages	73,7 (82)	87,8 (93)	44,7 (52)	48,8 (59)	43,2 (51)	35,3 (40)	38,2 (46)	46,8 (50)	53,2 (61)
Social work	2,5 (3)	1,2 (3)	2,5 (3)	0,3 (1)	5,4 (9)	4 (5)	9 (16)	6,8 (13)	18,9 (27)
Sociology	33,5 (51)	45,6 (63)	47,3 (64)	39,8 (62)	42,6 (59)	46,7 (63)	29,3 (52)	31,1 (51)	26,6 (43)
Statistics	5,9 (11)	4,3 (9)	11,6 (26)	14,3 (31)	9 (21)	12,1 (28)	10,7 (32)	13,8 (26)	12,4 (29)

Table A2-2. **Medfarm**. Publication volume by department and year.

Department	2014	2015	2016	2017	2018	2019	2020	2021	2022
Immunology, Genetics and Pathology	117,8 (366)	119,5 (373)	115,7 (403)	117,4 (370)	89,1 (322)	94,6 (342)	106,7 (378)	113,9 (383)	97,9 (360)
Medical Biochemistry and Microbiology	44,8 (112)	55,9 (167)	59 (175)	66 (169)	63,4 (187)	62,8 (178)	68,3 (191)	65,9 (230)	69,7 (237)
Medical Cell Biology	31,2 (67)	52,7 (102)	38,3 (84)	32,4 (76)	33 (78)	41,1 (93)	28,1 (85)	34 (119)	24 (102)
Medical Sciences	219,8 (710)	214,1 (695)	220,5 (764)	228,4 (850)	213,5 (752)	211,8 (807)	240,7 (878)	229,4 (887)	208,6 (783)
Medicinal Chemistry	40,7 (78)	38,1 (84)	36,2 (96)	36,4 (86)	28,9 (97)	33,7 (102)	34,3 (123)	33,9 (144)	24 (122)
Pharmaceutical Biosciences	47 (98)	40,1 (90)	61,2 (137)	52,5 (137)	56 (130)	41,2 (108)	56,1 (135)	51,2 (169)	53 (179)
Pharmacy	23,3 (57)	23,8 (41)	26,1 (54)	30 (55)	26 (61)	28 (60)	20,6 (52)	29,8 (97)	34,8 (129)
Public Health and Caring Sciences	112,8 (303)	115,1 (290)	109,7 (304)	117,3 (306)	106,3 (309)	104,7 (303)	97,4 (274)	113,5 (332)	109,2 (341)
Surgical Sciences	201 (494)	190,7 (493)	204,5 (535)	199,9 (568)	192,5 (536)	187,4 (536)	218,5 (614)	240,7 (707)	198,9 (606)
Women's and Children's Health	109,2 (265)	129,8 (285)	118,1 (313)	135,5 (331)	99,1 (281)	120,4 (351)	128,9 (366)	144,2 (427)	137,5 (421)

Table A2-3. Teknat. Publication volume by department and year.

Department	2014	2015	2016	2017	2018	2019	2020	2021	2022
Cell and Molecular Biology	53,1 (119)	57,9 (126)	59,6 (135)	60,3 (149)	78,8 (172)	53 (141)	59,6 (147)	48,5 (143)	41,9 (126)
Chemistry - BMC	43,7 (101)	38,4 (92)	40,7 (124)	35,3 (108)	41 (96)	27,8 (81)	39,7 (115)	39,5 (124)	32,6 (108)
Chemistry - Ångström Laboratory	125,1 (246)	131,2 (240)	129,5 (264)	127,9 (253)	125,1 (260)	137,6 (295)	135,2 (308)	118,5 (288)	121,7 (298)
Civil and Industrial Engineering	21,1 (35)	33,6 (60)	31,7 (49)	33,5 (49)	41,5 (69)	40,2 (54)	39,4 (66)	43,6 (70)	38 (68)
Earth Sciences	121,5 (279)	132,9 (315)	113,7 (270)	119,2 (268)	91,3 (219)	98,2 (246)	95,7 (249)	120,1 (324)	96,6 (279)
Ecology and Genetics	108 (255)	96,6 (236)	106,8 (266)	108,9 (254)	72 (209)	81,1 (199)	85,3 (209)	64,8 (215)	51,9 (152)
Electrical Engineering	101 (181)	90,5 (154)	96,8 (162)	87,2 (156)	83,8 (159)	75,7 (159)	66 (133)	65,8 (133)	68,6 (132)
Information Technology	177,9 (308)	205,5 (355)	175,5 (323)	189,3 (327)	177,7 (329)	143,5 (271)	150,4 (279)	127,2 (269)	138,2 (305)
Materials Science and Engineering	173,3 (303)	131,8 (254)	144,8 (279)	122,8 (252)	109,7 (229)	124,9 (245)	110,8 (233)	97,8 (212)	87,2 (225)
Mathematics	62,9 (106)	76,2 (122)	60 (99)	65,4 (121)	52,8 (83)	52,4 (86)	64,8 (106)	57,8 (99)	65,5 (114)
Organismal Biology	37,9 (99)	40,1 (110)	59,6 (140)	45,5 (107)	48,3 (117)	45,5 (112)	40,8 (122)	52,1 (159)	37,7 (111)
Physics and Astronomy	310,4 (698)	360,6 (802)	369,6 (822)	412,7 (896)	403,6 (882)	399,7 (801)	358 (785)	352,9 (818)	313,2 (762)



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