Evaluation of scientific and research activities at CZU

for the year 2021

Czech University of Life Sciences Prague

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Content

01 / Introduction 7

02 / Research projects 9

03 / Students of doctoral study programmes 15

04 / Career growth of CZU academic staff 19

05 / CZU's publication activities 21

06 / Publications of CZU employees published in 2021 in journals 33

07 / Results of applied research 37

08 / Evaluation of Module 1 according to Methodology 2017+ 39

09 / Summary 41

01
Introduction

01 / Introduction

The Evaluation of Scientific and Research Activities at CZU for the year 2021 is divided into four areas and includes the evaluation of

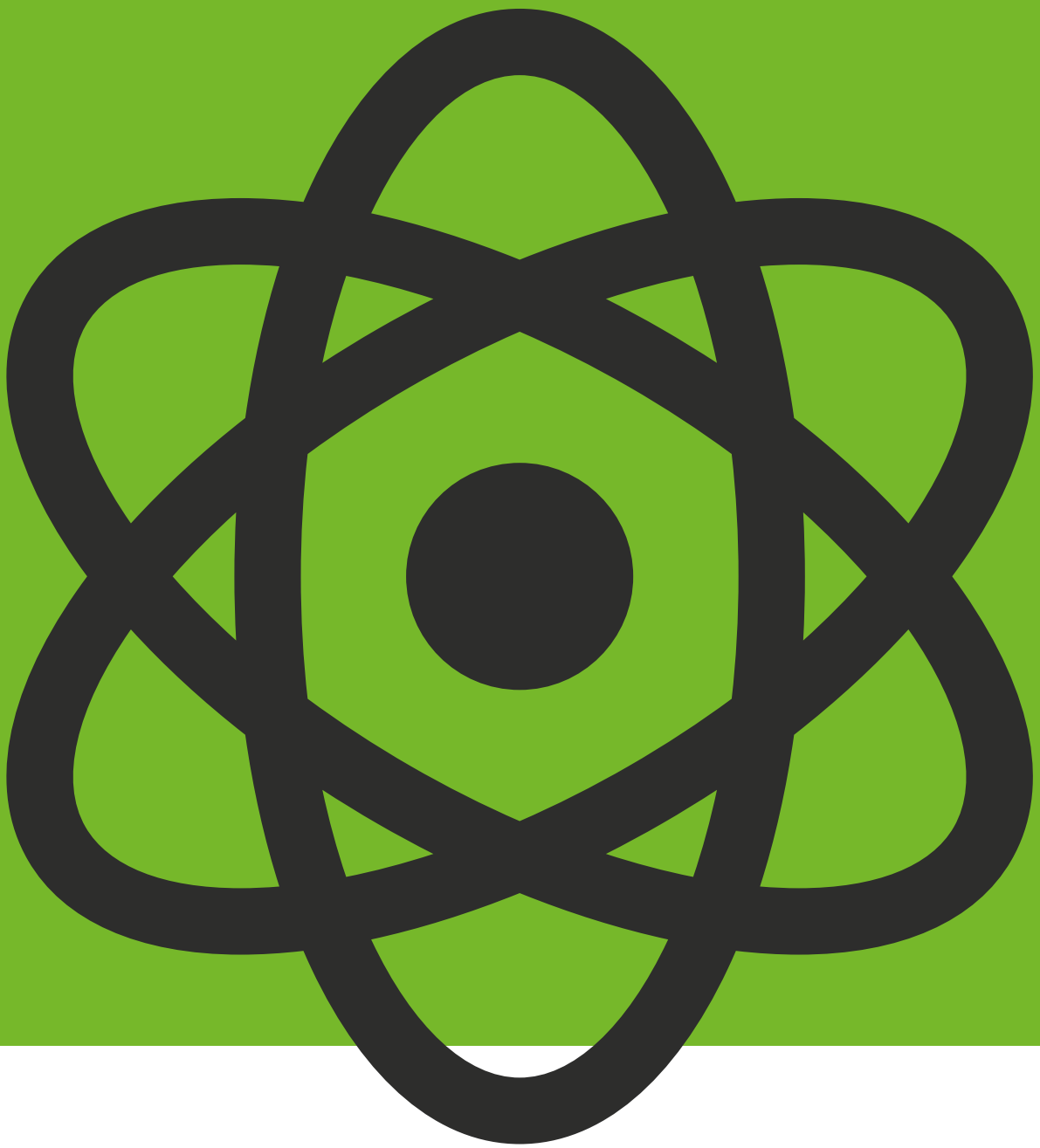
- research projects;
- doctoral studies;
- qualification growth of academic staff;
- publishing activities.

For better orientation, the following graphs show the individual faculties of the CZU, the Institute and the Rector's Office in colour	
FAPPZ	Faculty of Agrobiology, Food and Natural Resources
FZP	Faculty of Environmental Sciences
FLD	Faculty of Forestry and Wood Sciences
TF	Faculty of Engineering
PEF	Faculty of Economics and Management
FTZ	Faculty of Tropical AgriSciences
CZU-R	Rector's Office of the Czech University of Life Sciences Prague
IVP	Institute of Education and Communication

LIST OF INSTITUTION ABBREVIATIONS:

ČVUT – Czech Technical University
ČZU – Czech University of Life Sciences Prague
JČU – University of South Bohemia
OU – University of Defence
MIT – Massachusetts Institute of Technology
MENDELU – Mendel University
MU – Masaryk University
SUO – Silesian University in Opava
TUL – Technical University of Liberec
TUO – Technical University of Ostrava
UHK – University of Hradec Králové
UJEP – J. E. Purkyně University
UK – Charles University
UPARD – University of Pardubice
UPOL – Palacký University Olomouc
UTB – Tomas Bata University
VFU Brno – University of Veterinary Sciences Brno
VŠCHT – University of Chemistry and Technology in Prague
VŠE – Prague University of Economics and Business
VÚT – Brno University of Technology
ZČU – University of West Bohemia

02
Research projects



02 / Research projects

A total of 227 research projects from domestic and foreign sources were solved at the CZU in 2021, which represents 16 more projects than in 2020, 47 more projects than in 2019 (projects registered in the CEP and development aid projects are included. The number of projects solved in 2021, divided by faculties, institutes and CZU-R, is shown in Chart 1. The overview includes only projects whose funds are account managed by the CZU (i.e. have an assigned contract number). The breakdown of grants into domestic and foreign is shown in Table 1.

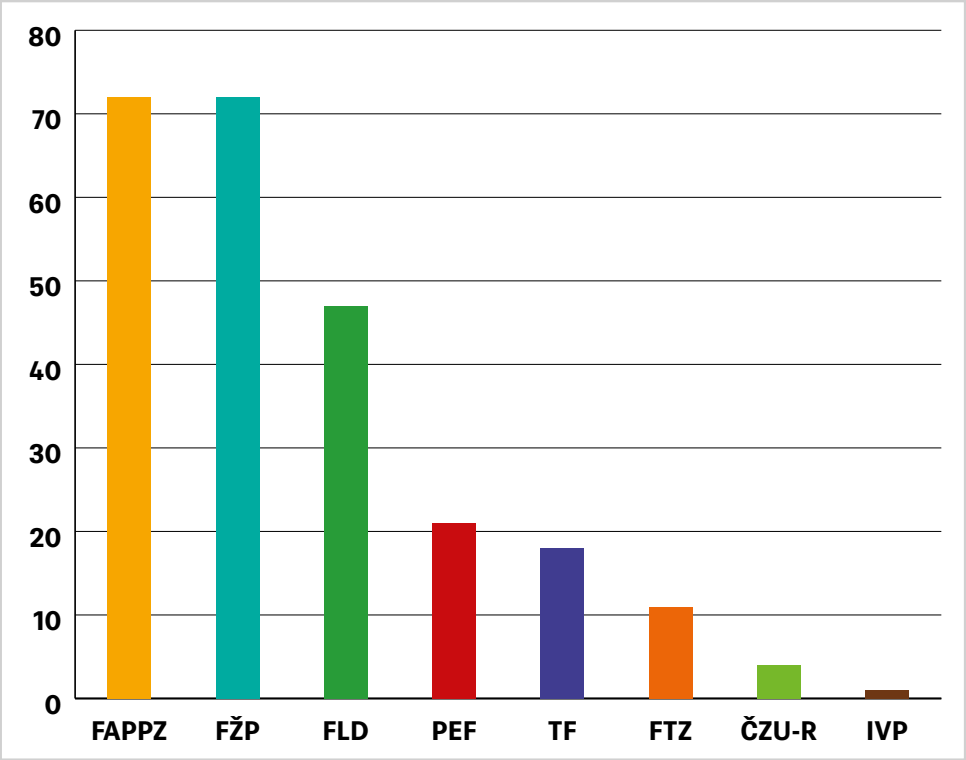


Figure 1: Number of ongoing research projects at CZU in 2021 divided by faculties.

Faculty	2021		2020		2019		2018	
	CZ	FRGN	CZ	FRGN	CZ	FRGN	CZ	FRGN
FAPPZ	67	2	56	4	60	0	63	0
FZP	63	3	61	4	49	1	39	2
FLD	38	5	33	1	26	1	33	0
TF	17	1	14	1	7	0	16	0
PEF	10	4	12	3	15	0	8	3
FTZ	9	3	17	1	14	1	6	0
CZU-R	4	0	3	0	2	1	3	0
IVP	1	0	1	0	1	2	0	0
Total	209	18	197	14	174	6	168	5

Table 1: Distribution of domestic and foreign projects in 2021 by faculties of CZU and comparison with 2018, 2019 and 2020.

Most grants in 2021 were addressed within the Technology Agency of the Czech Republic (TAČR - 63 projects), the Grant Agency of the Ministry of Agriculture (NAZV - 60 grants), and the Grant Agency of the Czech Republic (GAČR - 30 projects). The distribution of projects by provider is shown in Figure 2 by individual faculties of the CZU.

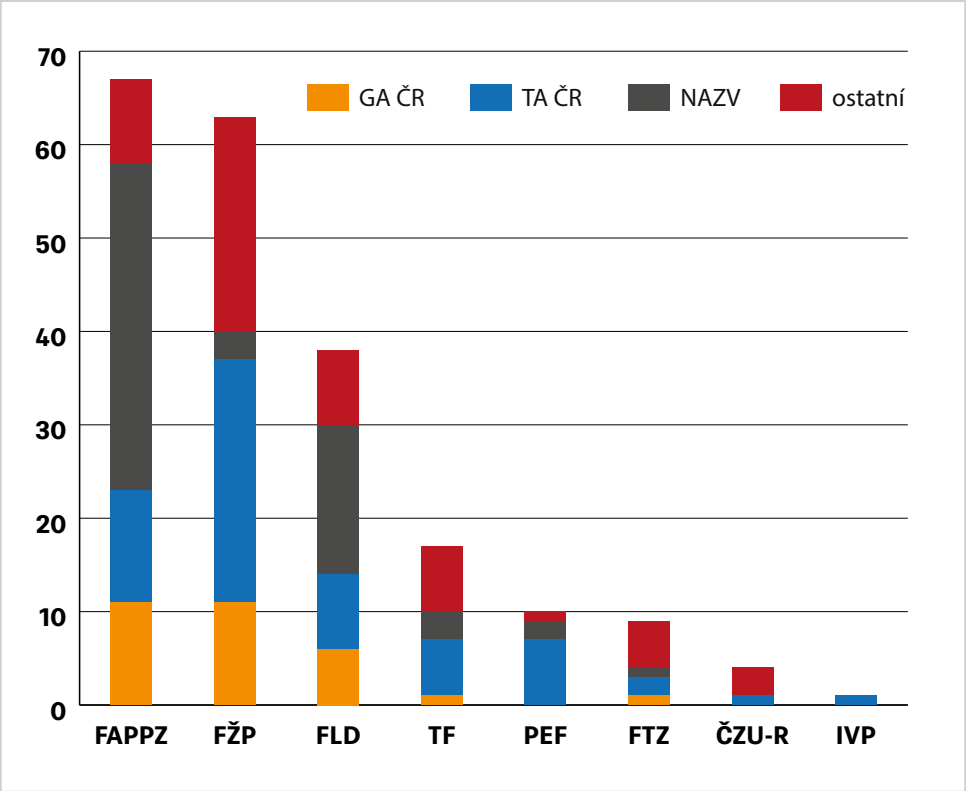


Figure 2: Number of projects solved in 2021 at CZU divided by the main domestic providers.

In 2021, the funds obtained by CZU through external research projects amounted to CZK 406.4 million. This is 13.4% less than in 2020 and 20.5% less than in 2019. The volume of funds obtained from research projects in 2021 and divided by faculties, institutes and CZU-R is shown in Figure 3.

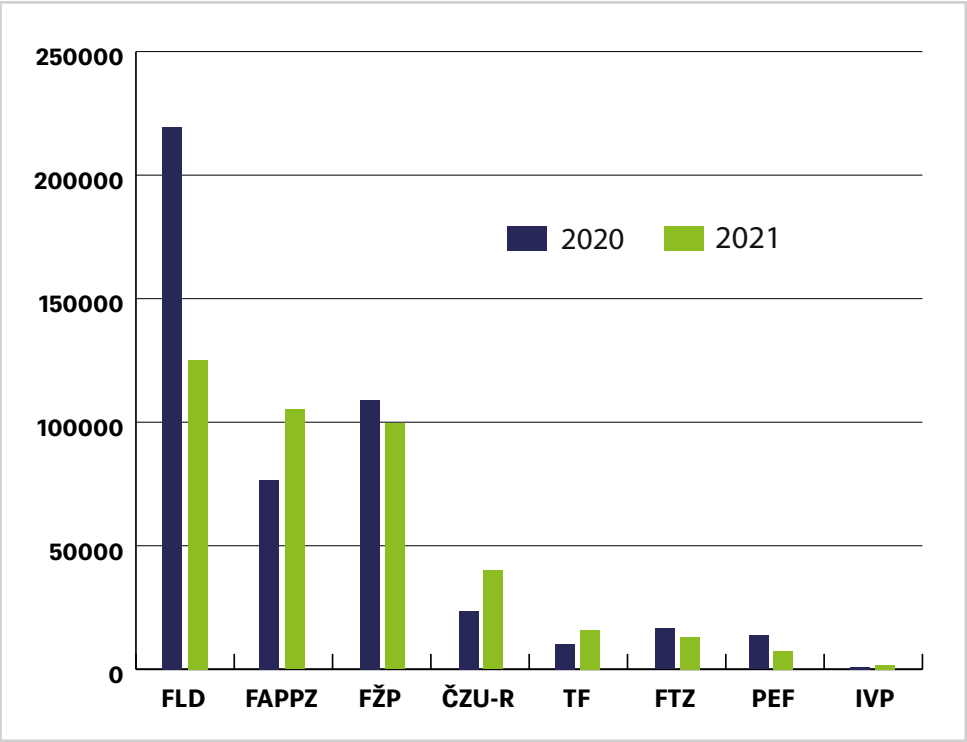


Figure 3: Funds from CZU research projects in 2021 divided by faculties and comparison with 2020.

In Figure 4, for a better idea of the total amount of research funds of individual faculties, the funds from external research projects are presented together with the amount of institutional support for the development of research organisations, divided by faculties and CZU-R. CZU received CZK 288,640 thousand through institutional support for the development of research organisations in 2021, which represents a 3% increase compared to 2020 (it was CZK 280,293 thousand). Therefore, if the amount of allocated institutional support is added to the funds obtained through grant agencies, the **total amount of CZU funds for science and research in 2021 reached CZK 694,998 thousand.** This is 6.4% less than in 2020 and 11.1% less than in 2019.

Relatively the largest amount of funds was obtained from Operational Programmes, 43% of the total number of domestic grants. Other funds came from NAZV (National Agency for Agricultural Research, 21%), TAČR (Technology Agency of the Czech Republic, 20%) and GAČR (Grant Agency of the Czech Republic, 8%). Additional funds were obtained from grants from the Ministry of Education, Youth and Sports, the Ministry of the Interior, the Ministry of Industry and Trade, the Ministry of Culture and the Prague City Hall. The amount of funding in the projects received from each domestic grant agency is shown in Figure 5.

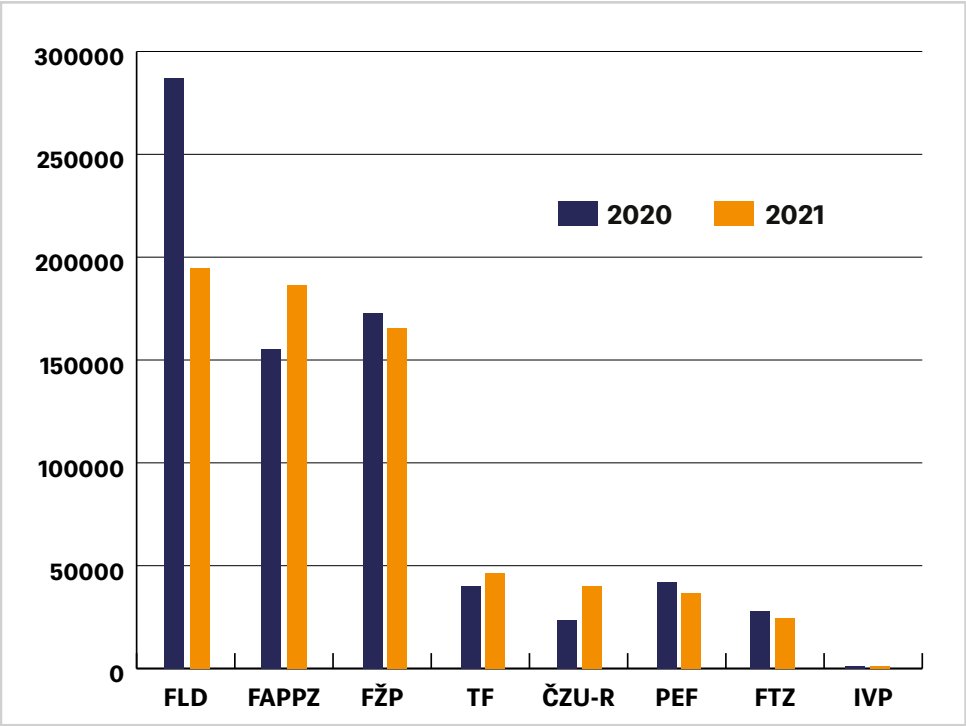


Figure 4: Funds from research projects (in CZK thous.) CZU in the years 2020-2021 increased by the allocated funds of institutional support divided by faculties.

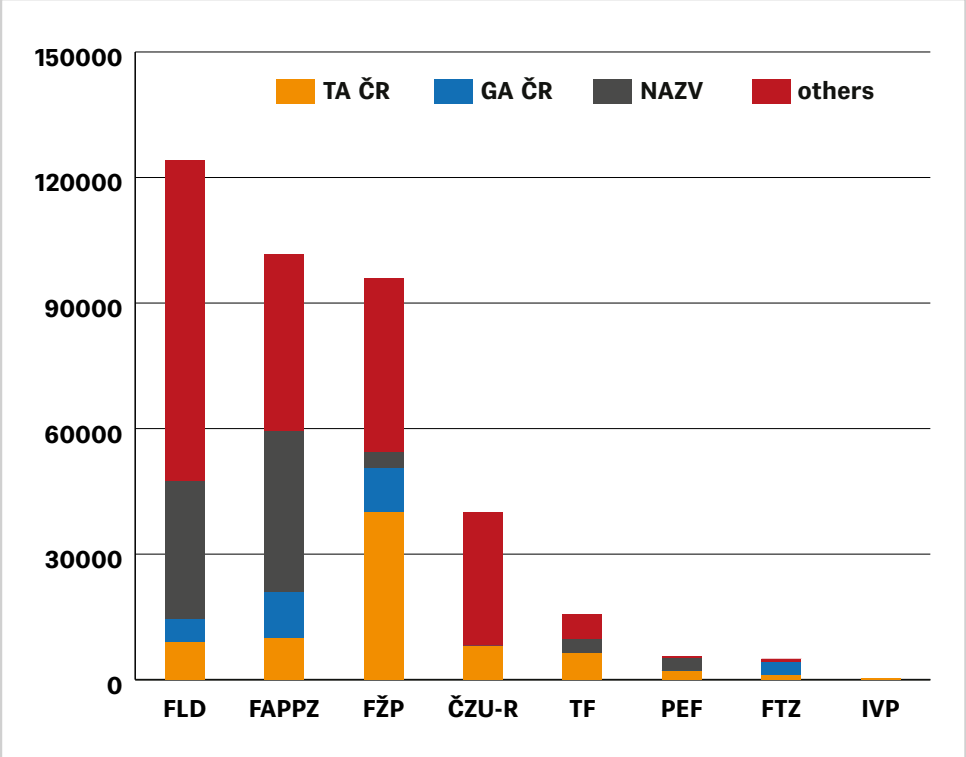


Figure 5: Funds from research projects (CZK in thous.) CZU in 2021 divided by main domestic providers.

Figure 6 shows the amounts from grant projects in 2021 per academic staff member of each faculty and institute.

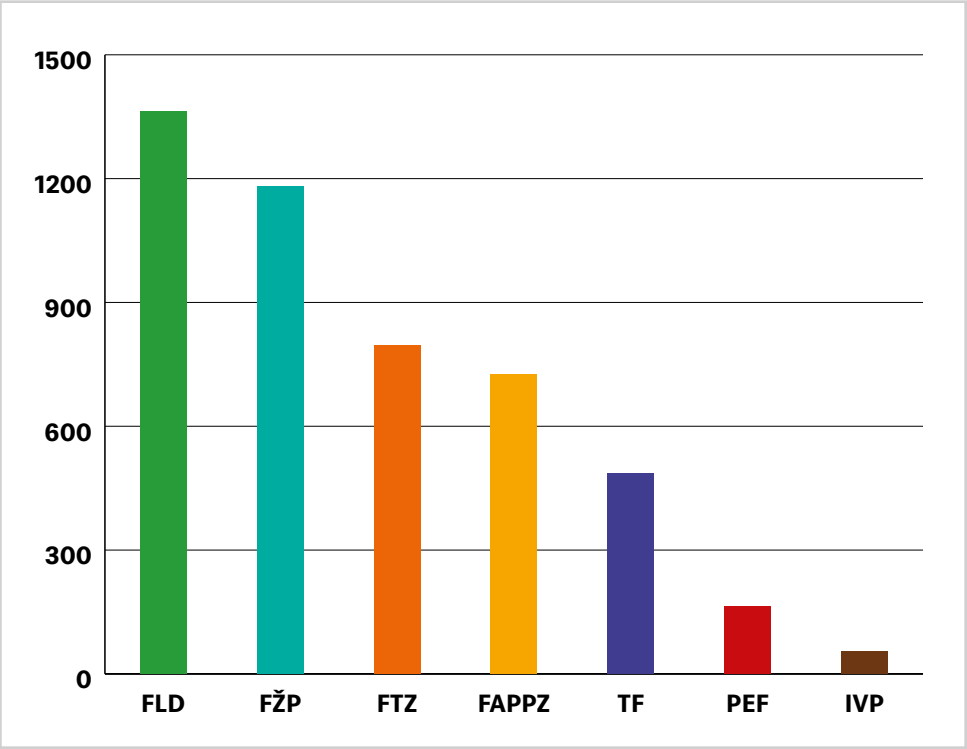


Figure 6: Grant funds (in CZK thous.) earned in 2021 per academic staff member of each faculty, including institutional support.

03
Students of doctoral study programmes

03 / Students of doctoral study programmes

The number of students in doctoral study programmes (DSP) in 2021 has fallen compared to 2020 by 15 students to 1085 (including students who have interrupted their studies). There were 824 students still studying, 3 less than in 2020. The number of DSP students by faculty is shown in Table 2. Number of DSP students studying as of 31/ 12/ 2021 divided by faculties and length of study together with the number of supervisors and the number of students per supervisor (active supervisors, i.e. those with Ph.D. students, are included) are shown in Table 3. If the number of students per supervisor includes only students studying at the university, the average number of students per supervisor is 3.0. If students who have interrupted their studies are included, the average of the CZU is 3.9.

Faculty	2017*	2018*	2019*	2020*	2021*
PEF	113/43	128/38	134/35	135/38	119/35
FAPPZ	168/100	188/94	198/68	223/61	236/55
TF	65/26	88/27	73/28	77/23	67/24
FZP	163/60	155/62	154/65	166/60	172/58
FLD	164/43	148/65	147/61	125/64	127/58
FTZ	65/34	77/32	90/30	101/27	103/31
CZU	738/306	784/318	796/287	827/273	824/261

* students studying/ students who have interrupted their studies

Table 2: Number of DSP students by faculty in 2017–2021.

Faculty	Students in regular study period				Total	Students per supervisor*		
	Year 1	Year 2	Year 3	Year 4		ST	IT	All
PEF	28	26	27	38	119	2.64	0.78	3.42
FAPPZ	59	50	55	72	236	3.15	0.73	3.88
TF	18	16	33	0	67	2.39	0.86	3.25
FZP	38	46	39	49	172	3.07	1.04	4.11
FLD	31	25	32	39	127	2.59	1.18	3.78
FTZ	18	23	42	20	103	4.48	1.35	5.83
CZU	192	186	228	218	824	2.99	0.95	3.93

* studying students/interrupted students/all students
ST = students studying
IT = students who have interrupted their studies

Table 3: Number of DSP students as of 31/12/2021 by year of study and faculties.

In 2021, 81 students graduated with a Ph.D., which is 39 more than in 2020, mainly due to the extension of the study period in 2020 (Figure 7). The numbers of graduates at each faculty were as follows: Faculty of Agrobiology, Natural and Food Resources 27, FLD:20, FE: 12, FTZ: 9, PEF:9 and TF: 4.

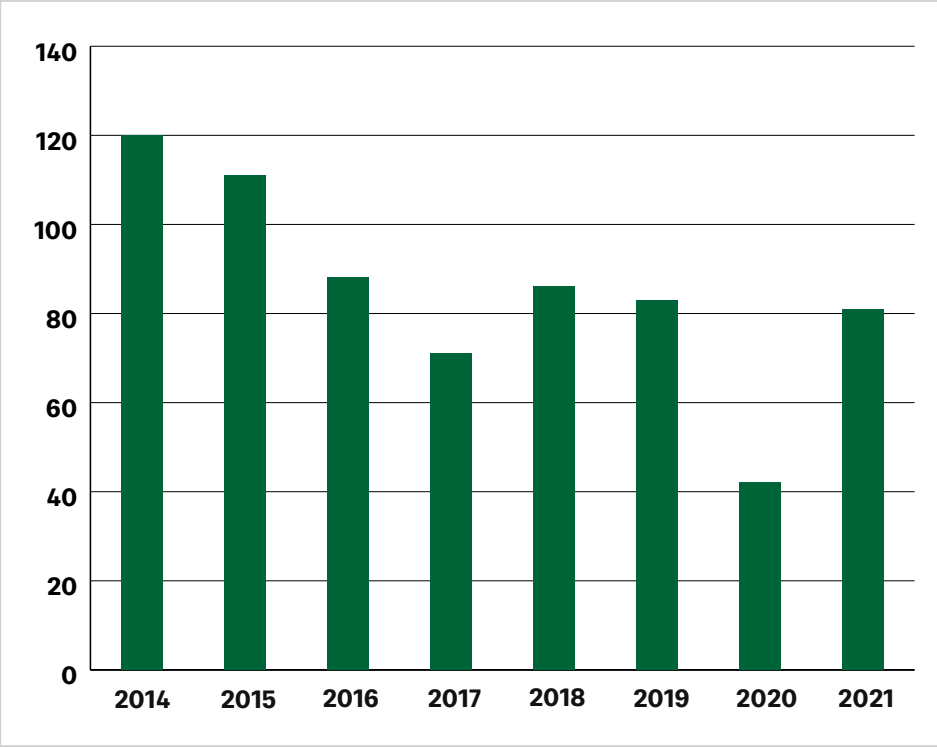
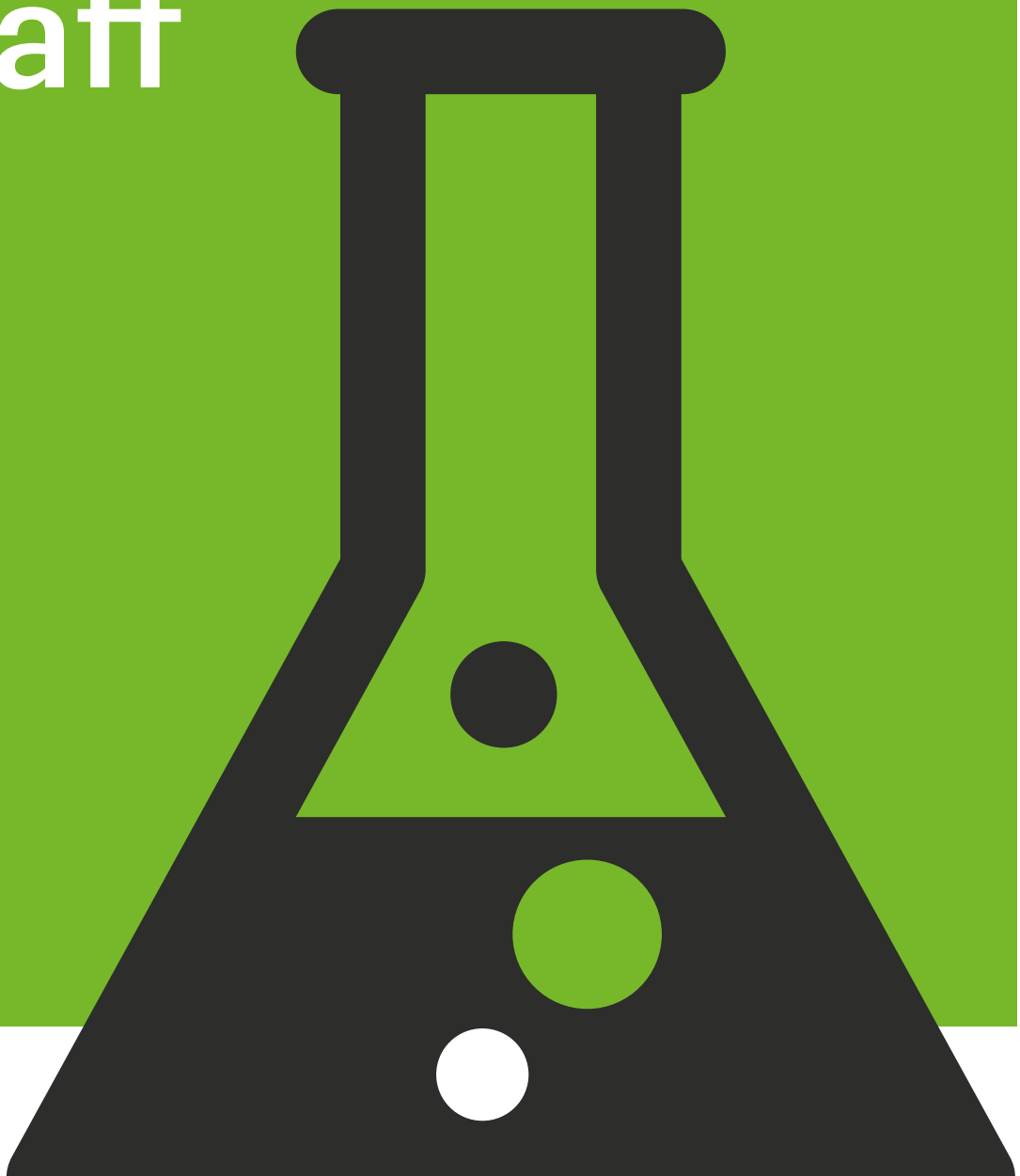


Figure 7: Number of DSP graduates in 2014–2021 at CZU.

04
Career growth of CZU academic staff



04 / Career growth of CZU academic staff

In 2021, 22 habilitation procedures were initiated at the CZU, which is 8 more than in the previous year, and 20 were completed (in 2020, 13 habilitation procedures were completed). In 2021, 6 procedures for the appointment of professor were initiated and 5 were completed (in the previous year, 5 procedures for the appointment of professor were initiated and 4 were completed). The number of initiated and completed habilitation procedures and procedures for the appointment of professor at individual faculties in 2021 is shown in Figure 8.

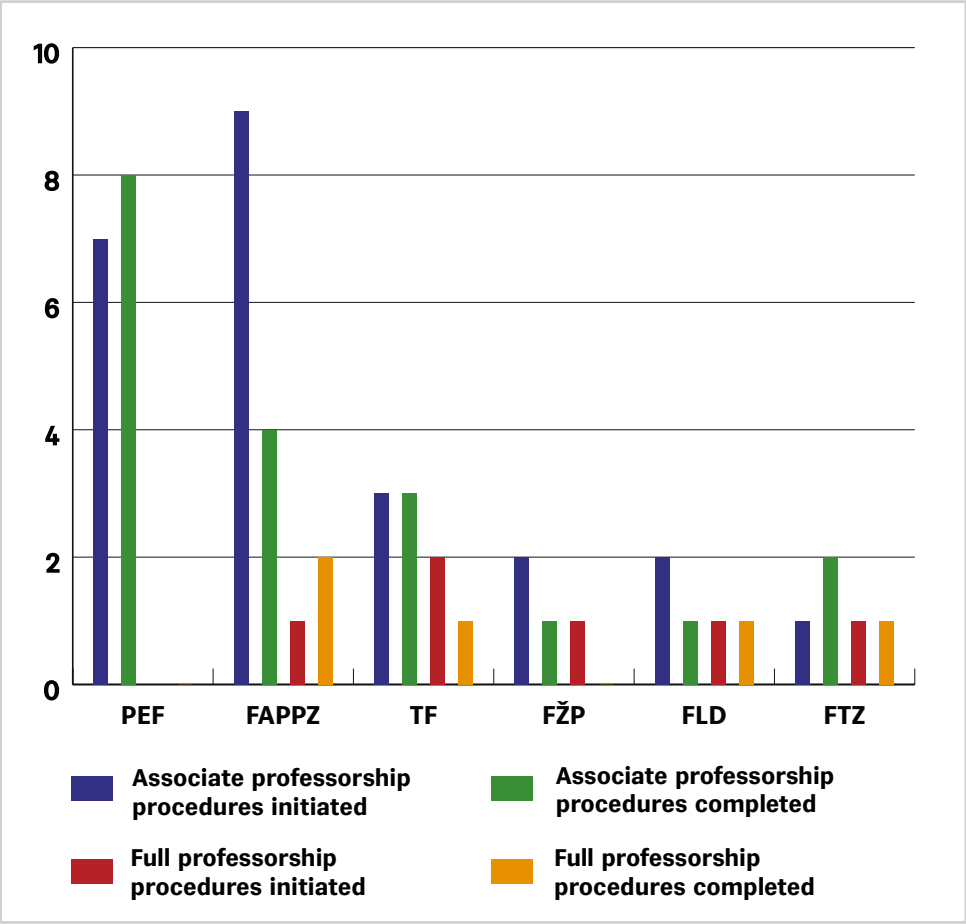


Figure 8: Number of habilitation and professorial procedures initiated and completed at the CZU in 2021.

05
CZU's publication activities

05 / CZU's publication activities

Figure 9 shows the evolution of the number of articles with impact factor on Web of Science. In 2001, 62 articles were registered in the Wos database, in 201 a total of 2017 articles and in 2021 the number of articles was already 1137.

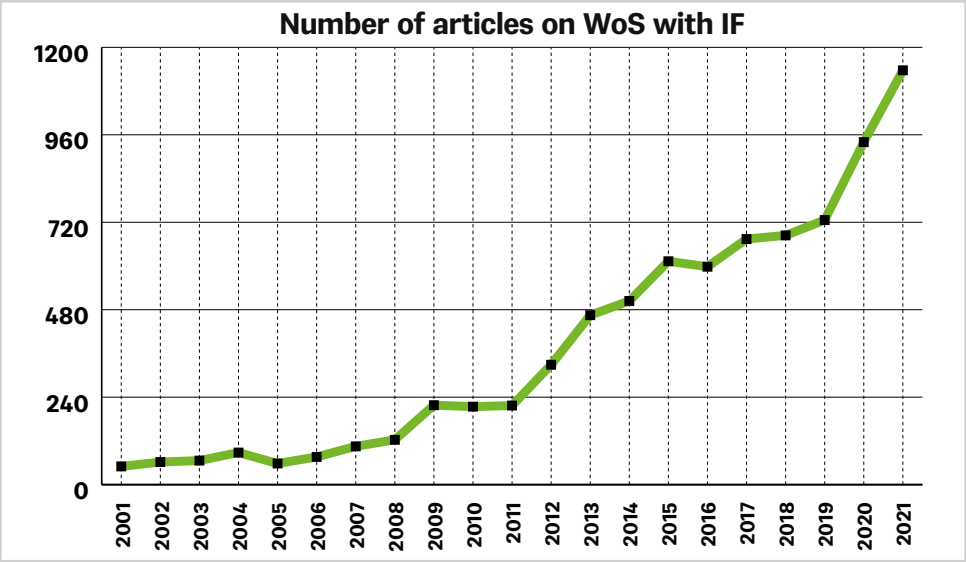


Figure 9: Number of articles with IF on Web of Science published at CZU between 2001 and 2021.

In 2021, a total of 1,229 scientific publications were published by CZU Prague staff, which are registered in the Web of Science and Scopus databases (Figure 10), which is 182 more outputs than in 2020 and 319 more than in 2019. **A total of 1,137 articles were published in the Web of Science database in 2021, 197 more than in 2020 and 411 more than in 2019.** From this point of view, the productivity of CZU employees has had a significantly increasing trend in recent years. In contrast, the number of articles in the Scopus database (92) decreased by 15 articles year-on-year, down by 92 articles compared to 2019 and by 199 articles compared to 2017. In Figure 11, the outputs in the two databases are shown separately.

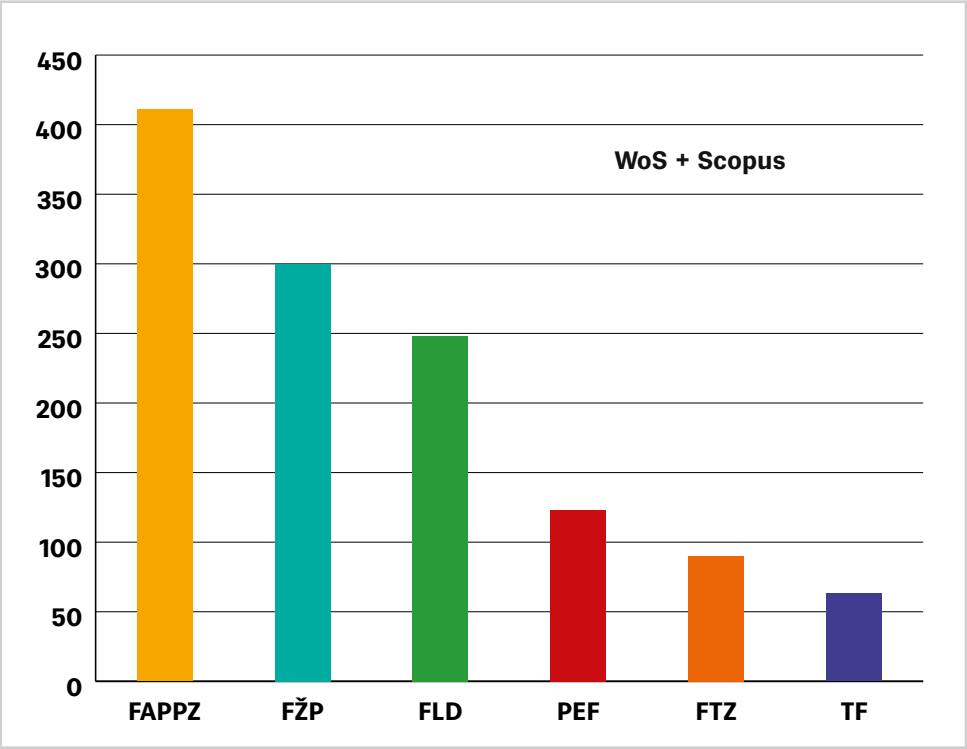


Figure 10: Number of publication entries registered in the Web of Science and Scopus databases in 2021. For articles in the Scopus database, these are articles that are not also registered in the Web of Science database.

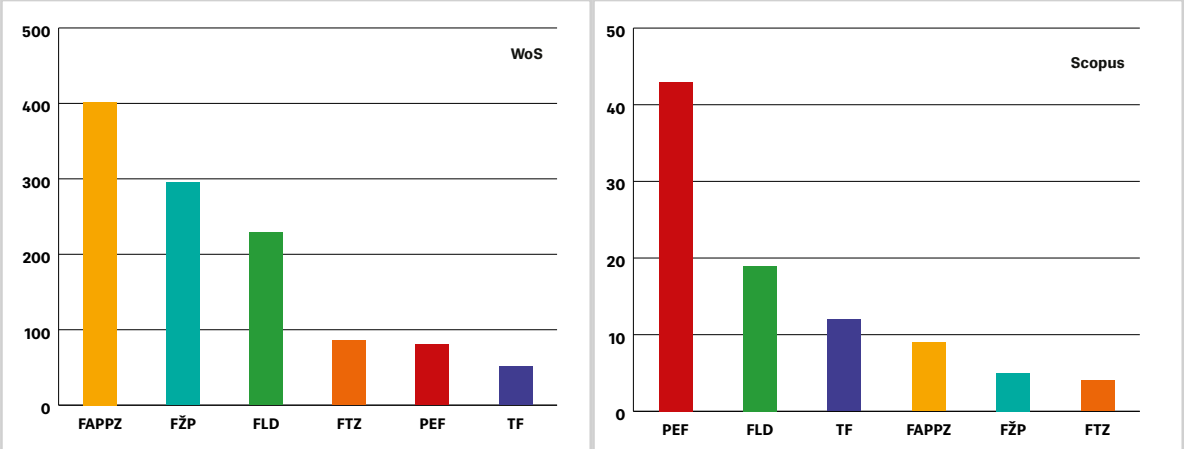


Figure 11: Number of publications registered in Web of Science (left) and Scopus (right) in 2021. For articles in the Scopus database, these are articles that are not also registered in the Web of Science database.

Figure 12 shows publications registered in the Web of Science database by quartiles in terms of AIS in 2017-2021. The graph shows a significant increase in the number of articles in the Q1 and Q2 categories. **Compared to 2017, the number of articles in the Q1 category increased by 68% and in the Q2 category by a full 157%. In 2021, articles in Q1 and Q2 accounted for a full 74.2% of the total number of articles on WoS.** The number of articles in the D1 category decreased slightly compared to 2020 (by 3 articles) and in 2021 D1 articles accounted for 9.6% of the total. The steady decline in Q4 cells is also positive.

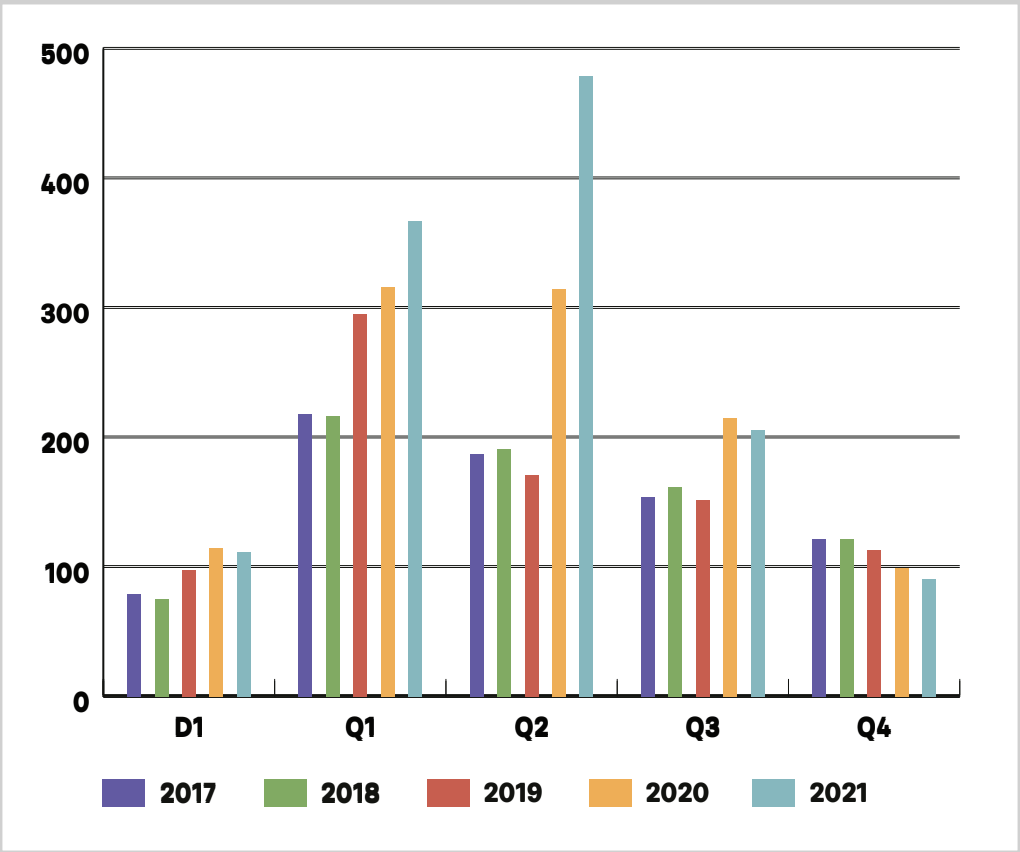


Figure 12: Number of articles of CZU staff registered on Web of Science divided by AIS quartiles in 2017–2021. Articles in category D1 are also included in category Q1.

The total number of WoS articles at individual faculties in the period 2017-2021 is shown in Figure 13. All faculties have seen a significant increase in the number of publications over the period. Figure 14 shows the number of articles with IF/AIS per staff member at each faculty. Figure 15 shows the distribution of publications by quartile and decile at individual faculties for the period 2017-2021.

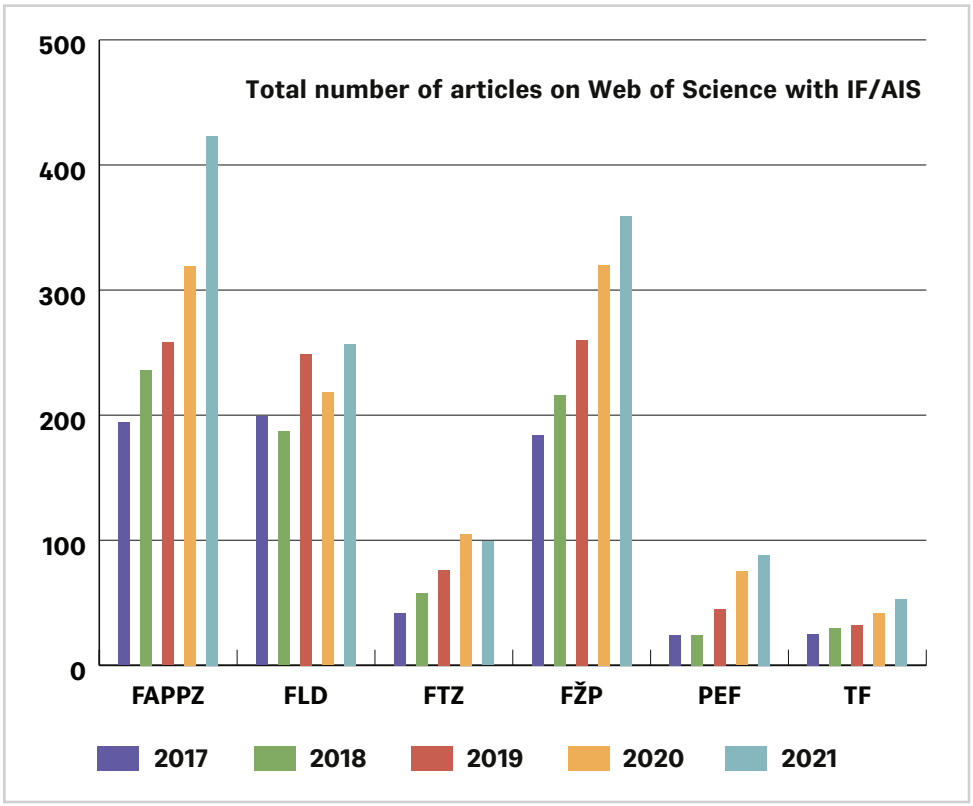


Figure 13: Total number of articles on Web of Science with IF/AIS at individual faculties in the period 2017–2021.

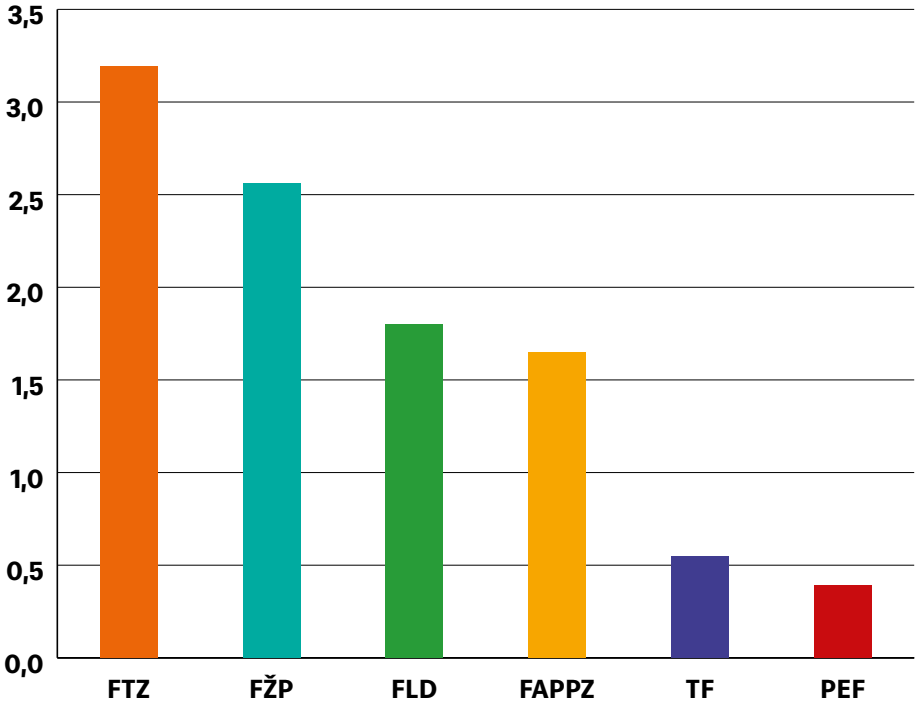


Figure 14: Number of articles with IF/AIS per academic staff member at individual faculties of the Czech University of Life Sciences in 2021.

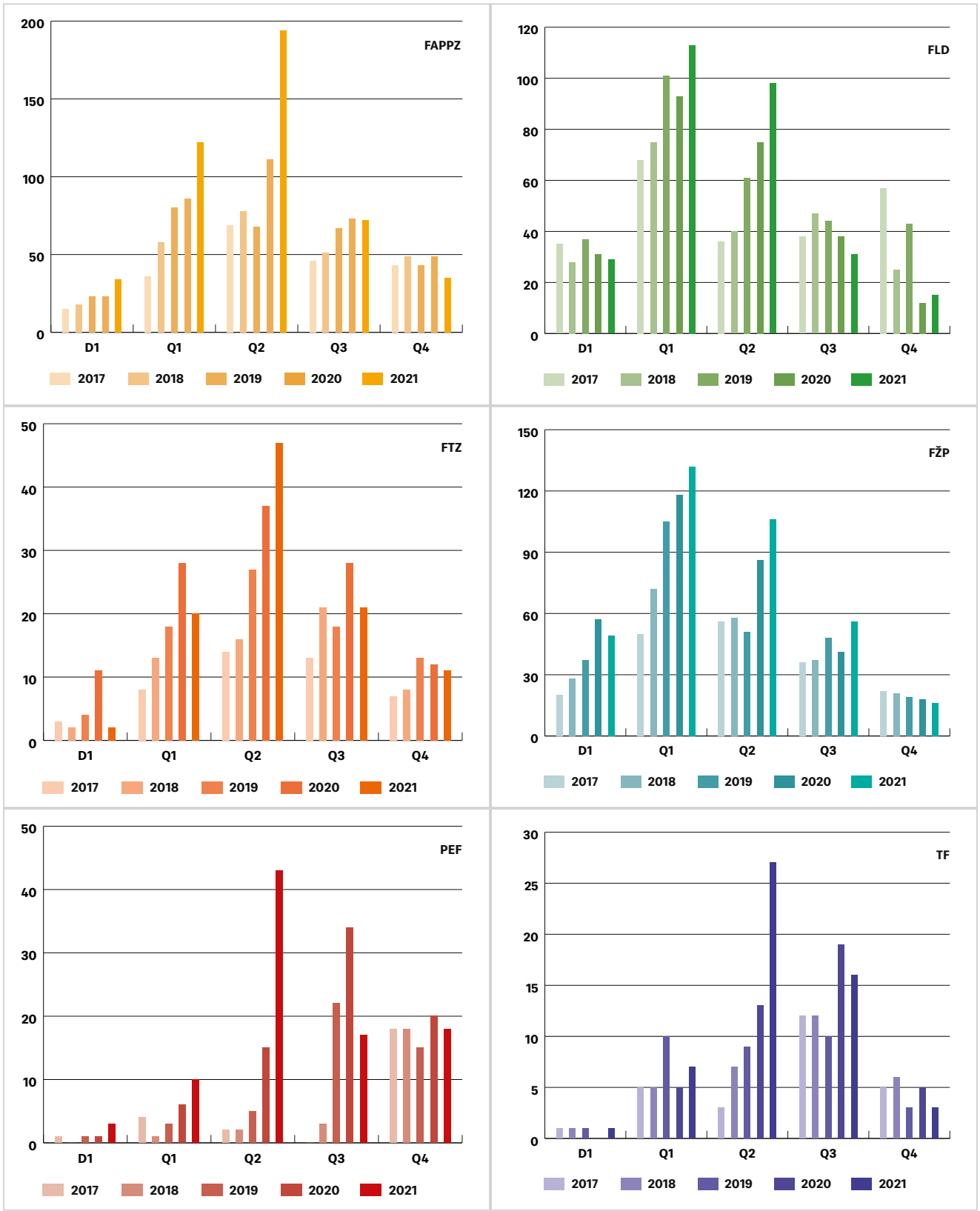


Figure 15: Distribution of publication outputs on Web of Science into quartiles by AIS for individual faculties in the years 2017–2021.

Figure 16 compares CZU with nineteen universities in the Czech Republic, Euroleague universities and selected top world universities by percentage of articles in Q1 (IF) on Web of Science in 2021. **CZU ranked 4th among universities in the Czech Republic (53.04%)** and improved by one place compared to 2020 (5th place, 51.29%) and significantly improved compared to 2019 (7th place, 45.52%), 2018 (11th place, 38.02%) and 2010 (14th place, 28.57%).

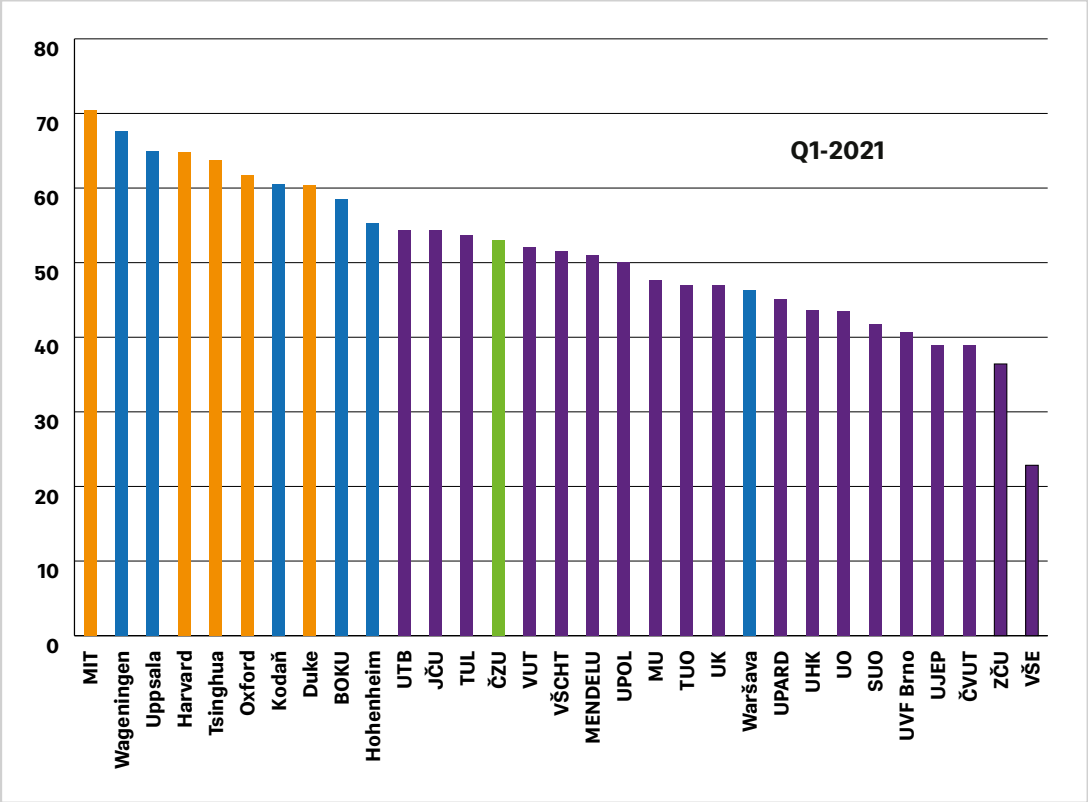


Figure 16: Percentage of CZU articles (in green) that were included in Web of Science in Q1 by impact factor in 2021. Euroleague universities (in blue) and some of the world's top universities are also listed for comparison. Source: Clarivate, InCites.

Figure 17 shows the development of the number of publications of CZU employees in Q1 according to Web of Science in the period 2001-2021. **While in 2001 only one article was published at the CZU in Q1, in 2021 there were 637 articles.** In Figure 18, the number of articles in Q1 according to Web of Science is expressed as a percentage of the total number of articles on WoS for the period 2001-2021. Here, too, we can see a significant increase - **while in 2001 the share of articles in Q1 was only 2%, in 2021 it was a full 53.04%.**

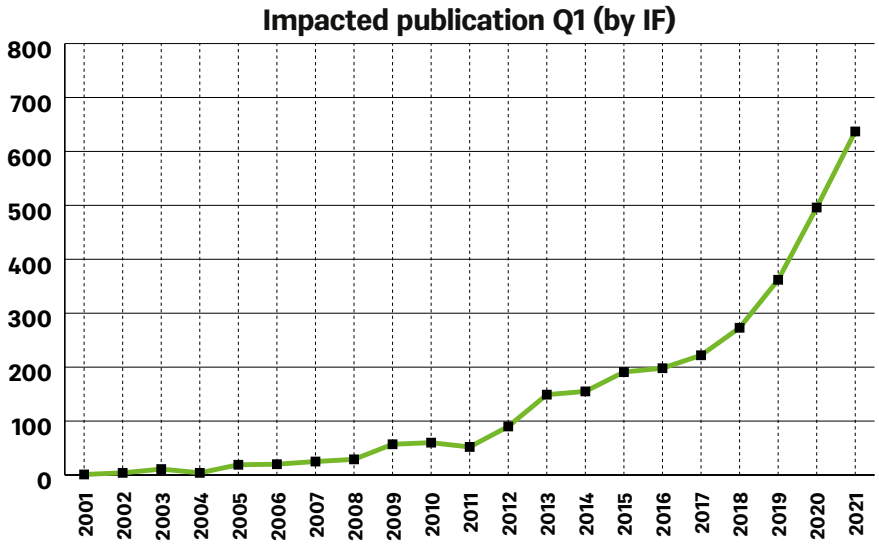


Figure 17: Number of publications of CZU employees in Q1 by Wos in the period 2001–2021.

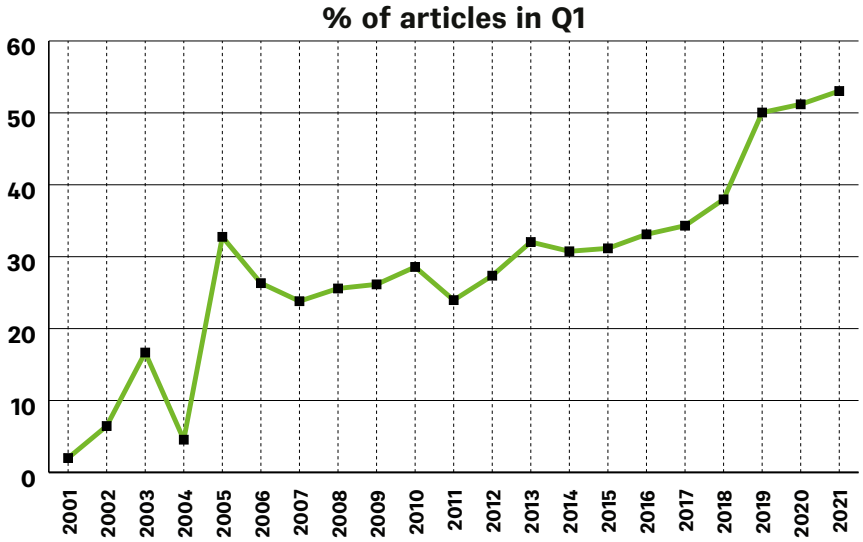


Figure 18: Percentage of articles in Q1 out of the total number of articles published by CZU staff in 2001–2021.

Figure 19 shows a similar comparison for cells that were classified in the first decile of D1. CZU has slightly deteriorated its position in 2021 (3rd place compared to 2nd place in 2020), but the **percentage of articles in D1 has increased year-on-year from 11.94% to 13.12%.** In 2019 and 2018, CZU ranked 5th (9.23%) and 4th (9.78%) in this parameter, respectively. Compared to 2010, however, this is a significant increase, as in that year the CZU ranked 17th among Czech universities (6.13%).

Figure 20 shows the evolution of the number of articles of CZU employees in the D1 category for the period 2001-2021. **In 2001, only one article was classified as D1, in 2021 there will be 161. The percentage of D1 cells has increased from 3.45% in 2001 to 13.12% in 2021** (Figure 21).

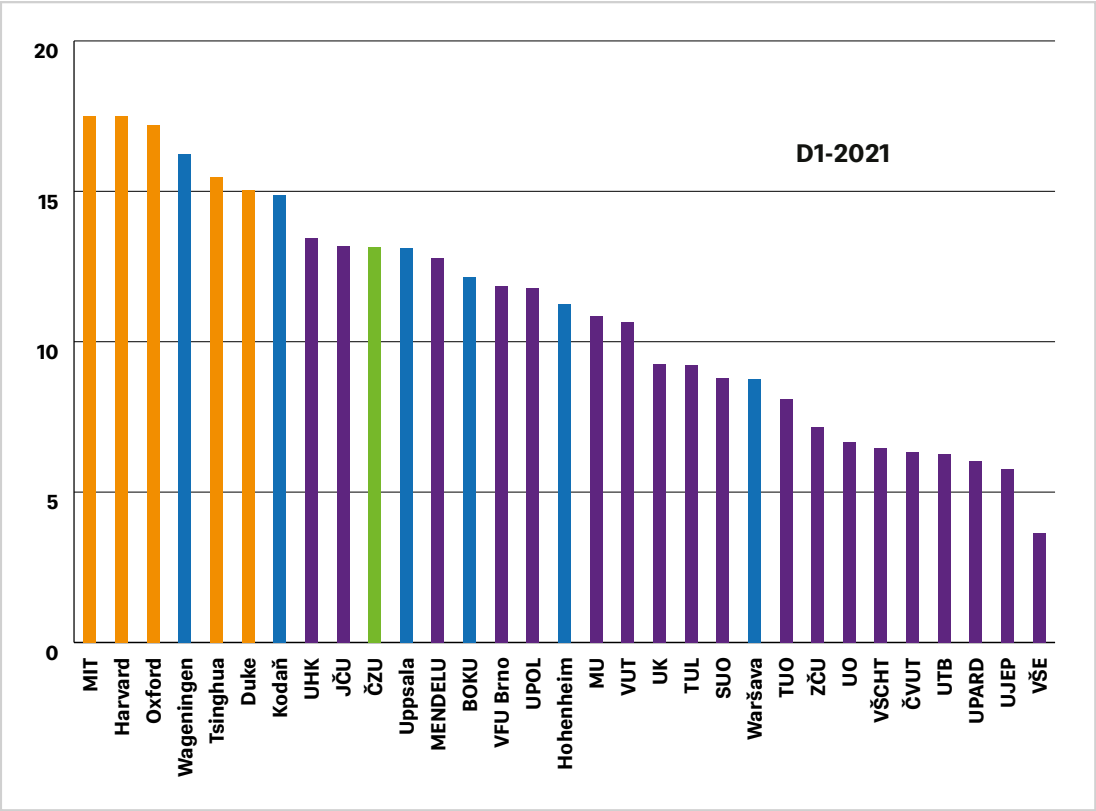


Figure 19: Percentage of CZU articles (in green) that were included in Web of Science in D1 by impact factor in 2021. Euroleague universities (in blue) and some of the world's top universities are also listed for comparison. Source: Clarivate, InCites.

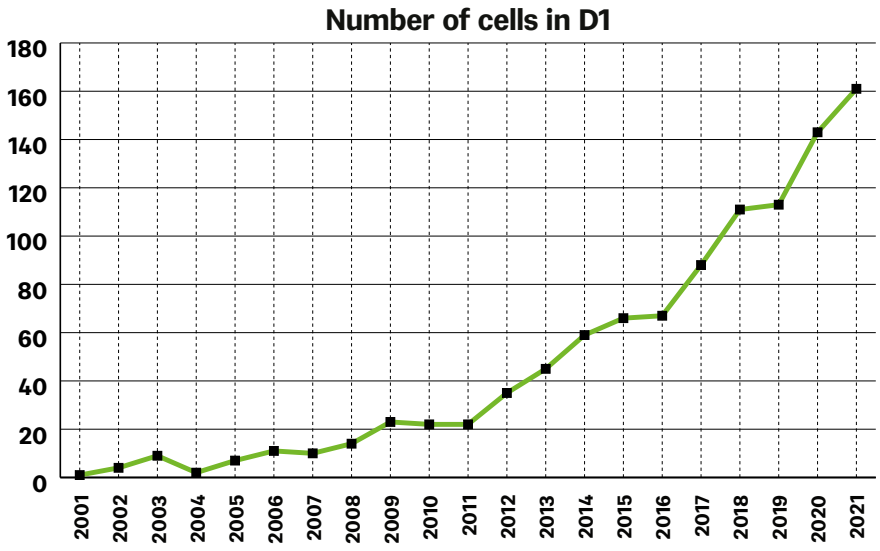


Figure 20: Number of publications of CZU employees in D1 by Wos in the period 2001–2021.

The increase in the quality of articles by CZU staff is inevitably reflected by a significant decrease in the proportion of articles in Q4 (Figure 22), in addition to the increasing proportion of articles in D1 and Q1. In 2021 it was only 4.08% and only Brno University of Technology had a lower percentage of articles in Q4 (3.98%). In the long term, the decline in the number of articles in the Q4 category and especially the decline in the percentage of Q4 articles is very pronounced (Figures 23 and 24).

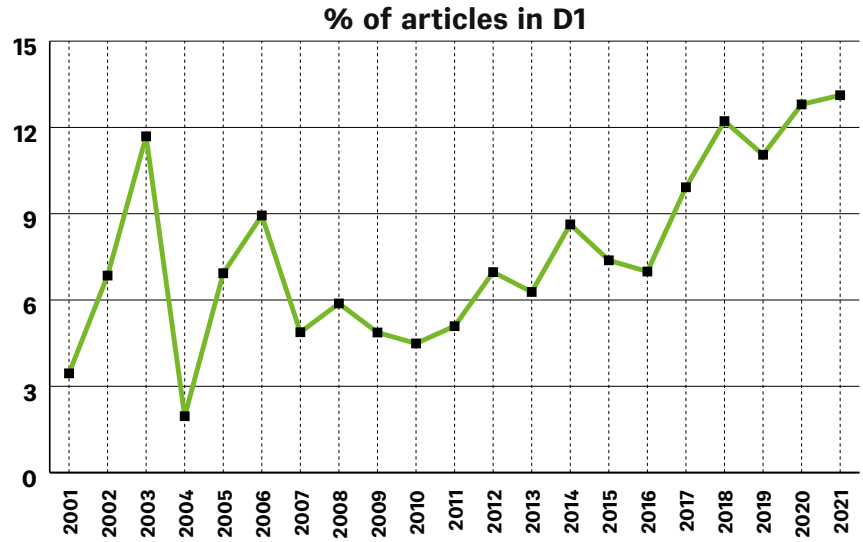


Figure 21: Percentage of articles in D1 out of the total number of articles published by CZU staff in 2001–2021. Source: Clarivate, InCites.

The number of articles in the Q34 category was higher in 2021 (49) than in 2001 (34), but in 2001 there were only 50 articles registered on WoS, while in 2021 there were 1137 articles. **In 2004, a full 72.73% of the articles were classified as Q4, while this year only 4.07% were classified as Q4** (Figure 23).

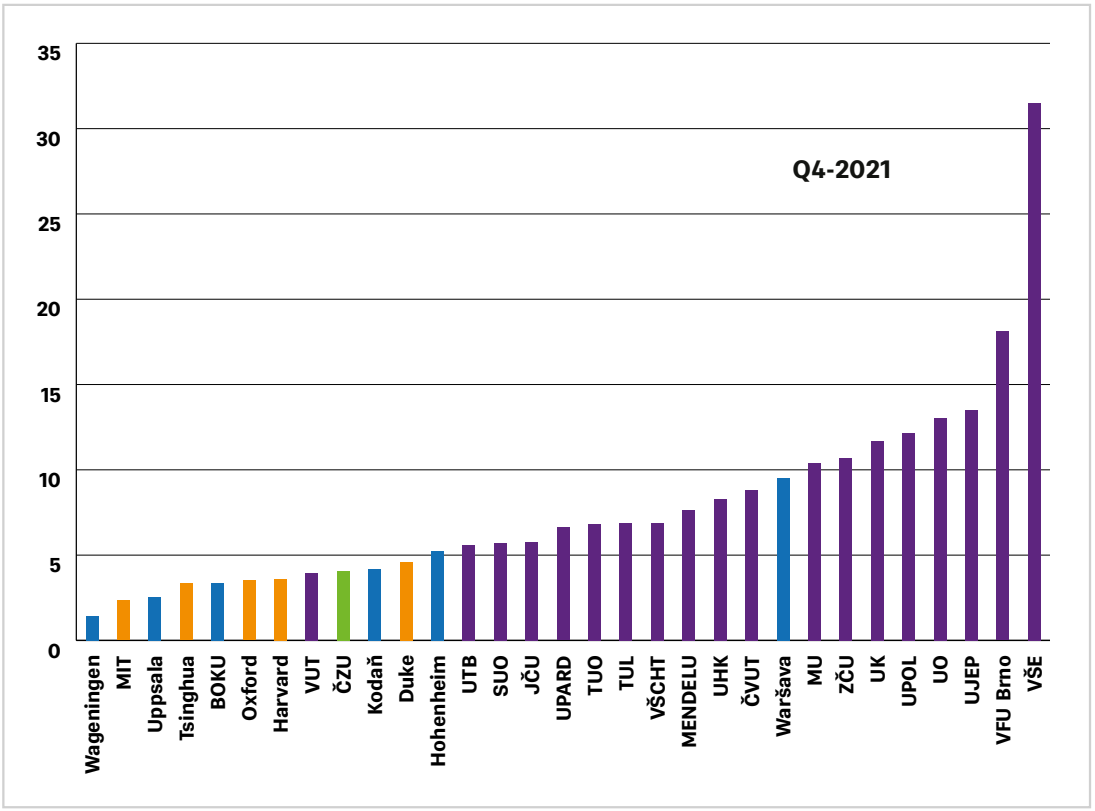


Figure 22: Percentage of CZU articles (in green) that were included in Web of Science in Q4 by impact factor in 2021. Euroleague universities (in blue) and some of the world's top universities are also listed for comparison. Source: Clarivate, InCites

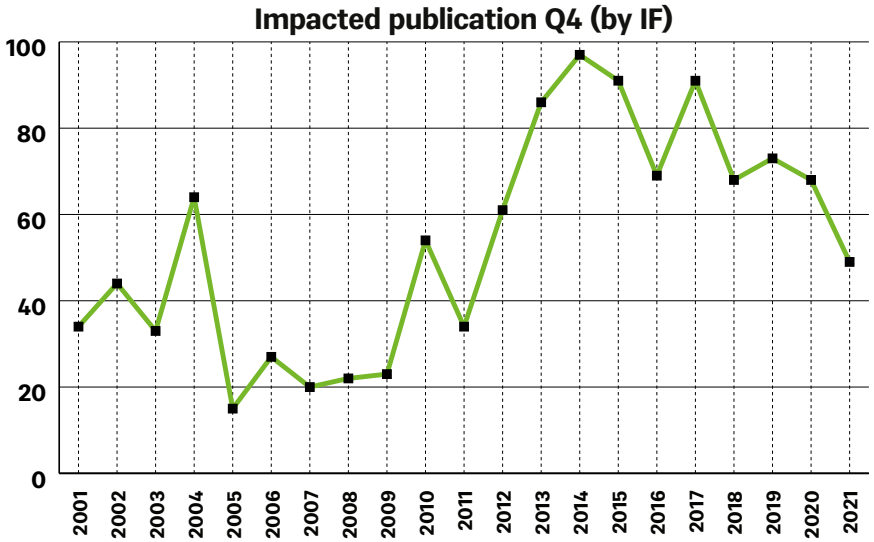


Figure 23: Number of publications of CZU employees in Q4 by Wos in the period 2001–2021.

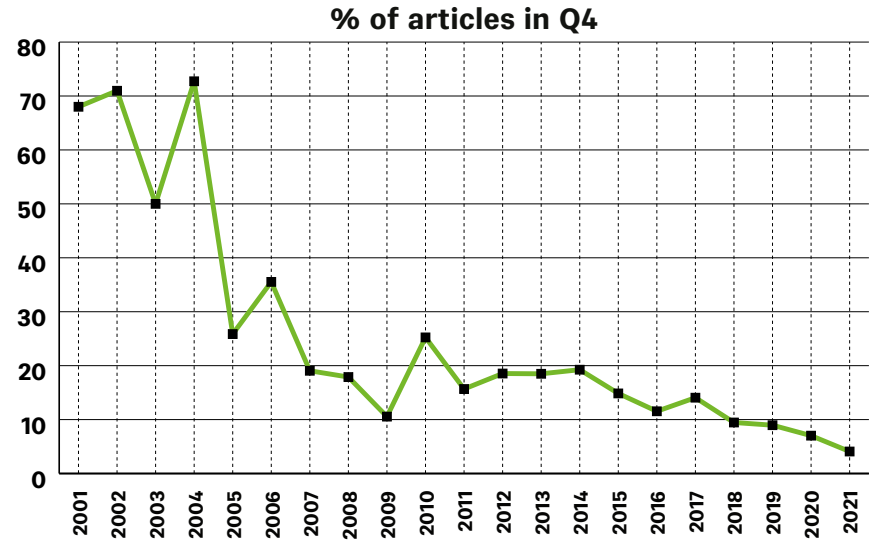
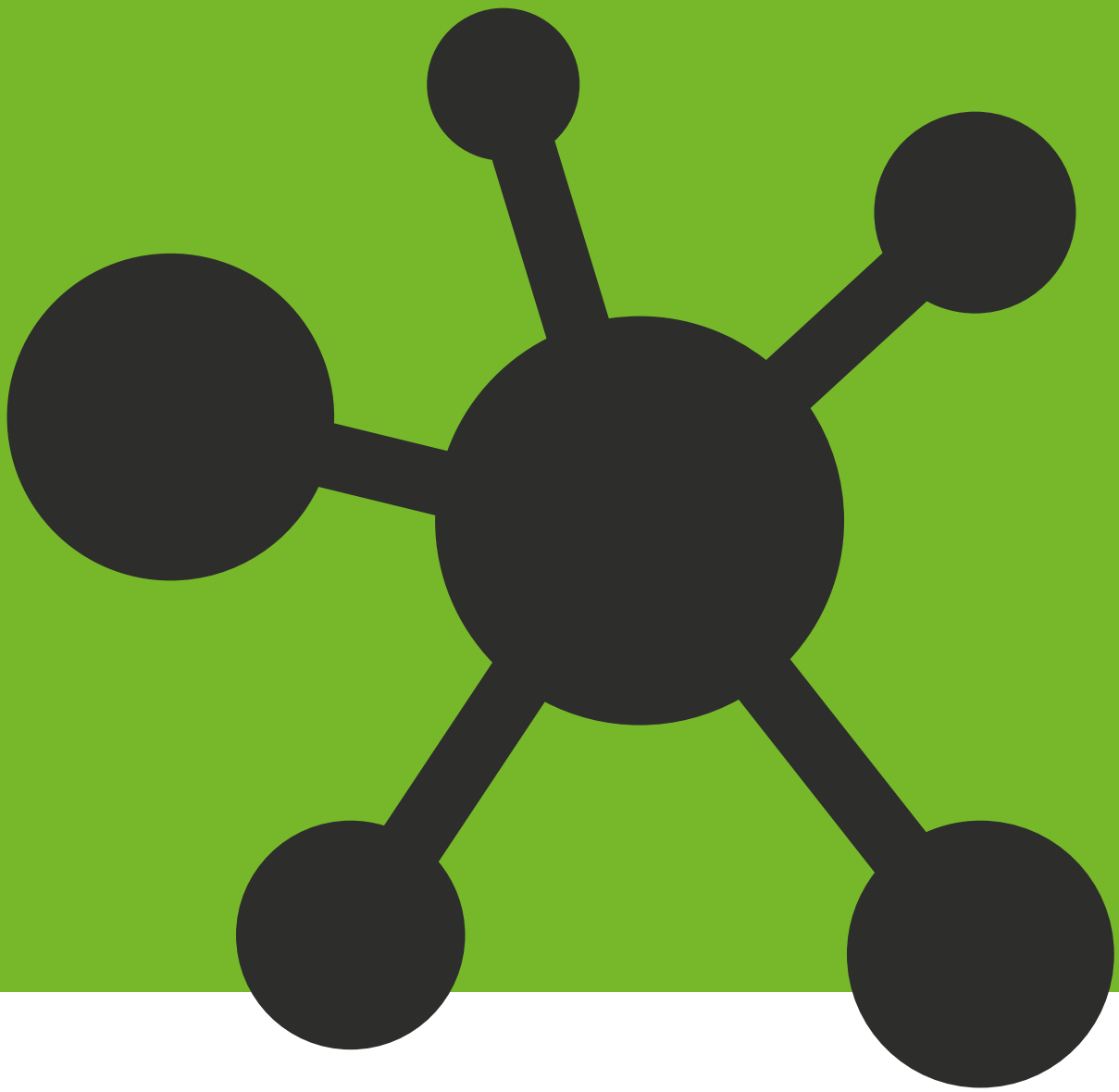


Figure 24: Percentage of articles in Q4 out of the total number of articles published by CZU staff in 2001–2021.

06
Publications of CZU employees



06 / Publications of CZU employees published in 2021 in journals included in the Nature Index database

(In bold there are CZU employees)

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22 articles in total: 12x FLD (1 joint cell with FTZ), 8x FŽP, 2x FAPPZ.

07
Results of applied research

07 / Results of applied research

The results of applied research of the type book and book chapter, patent, utility model, certified method, software, research report and conference proceedings for the year 2021 are listed in Table 4.

Faculty	Book + chapter in book	Czech patent	Utility model	Certified methodology	Software	Research report	Conference proceeding
PEF	18	0	2	4	6	9	86
FAPPZ	8	3	6	17	6	43	64
TF	6	1	0	0	0	4	10
FŽP	10	0	2	6	6	1	2
FLD	13	1	5	2	8	13	30
FTZ	8	0	1	2	0	6	2
IVP	0	0	0	0	0	0	3

Table 4: Results of applied research in 2021 at CZU.

08

Evaluation of Module 1 according to Methodology 2017+

08 / Evaluation of Module 1 according to Methodology 2017+

Table 5 shows the ratings of the outputs of the CZU that were selected as „quality outcomes" in 2016–2020.

Qualitative scale for the evaluation criterion **„contribution to knowledge"**:

- A result that is world-leading in terms of originality, significance and difficulty to obtain.
- A result that is internationally excellent in terms of originality, significance and difficulty of acquisition, but does not reach the highest level of excellence (excellent).
- A result that is internationally recognised in terms of originality, significance and difficulty to obtain.
- A result that is nationally recognizable in terms of originality, significance, and difficulty to obtain.
- A result that does not meet the standard of nationally recognized work.

The qualitative scale for the evaluation criterion **„social relevance"** is as follows:

- A world-leading result, the use of which in practice will bring about a fundamental change with international economic impact (a realistic assumption of broad application in multiple foreign markets, etc.) or a change with an extraordinary international impact on society (a realistic assumption of fundamental application at the international level in areas of public interest).
- A result at an excellent level (excellent), the use of which in practice will bring about change with an international economic impact (a realistic assumption of application in a foreign market, etc.), or a change with a significant impact on society (a realistic assumption of a fundamental application in areas of public interest).
- A result at a very good level, the use of which in practice will bring about change with an economic impact on the Czech market or a change with an impact on society (a realistic assumption of application in areas of public interest).

- A result at an average level, the use of which in practice will bring a partial change with an economic impact on the Czech market or a partial change with an impact on Czech society (a realistic assumption of partial application in areas of public interest).

- The result is at a below-average level, the use of which in practice is unlikely to bring any change with economic impact or change with impact on Czech society (there is no realistic expectation of application in areas of public interest).

Rating	1	2	3	4	5
2016	0	4	12	5	4
2017	0	14	15	14	4
2018	4	11	15	8	3
2019	1	15	13	10	2
2020	3	9	19	12	1
Total	**8**	**53**	**74**	**49**	**14**

Table 5: Evaluation of Module 1 according to the 2017+ Methodology in 2016–2020.

09 / Summary

The funds obtained in 2021 by the CZU through external research projects totalled CZK 406,358 thousand . If the amount of allocated institutional support is added to the funds obtained through grant agencies, the total amount of CZU funds for science research in 2021 will reach CZK 694,998 thousand, which is 6.4% less than in 2020 and 11.1% less than in 2019.

A total of 227 research projects from domestic and foreign sources were solved at the CZU in 2021, which represents 16 more projects than in 2020 and 47 more projects than in 2019. The largest number of grants in 2021 was addressed within the Technology Agency of the Czech Republic (63 projects), the Grant Agency of the Ministry of Health (60 grants) and the Grant Agency of the Czech Republic (30 projects).

The number of students in doctoral study programmes in 2021 decreased by 15 students to 1085 compared to 2020. There were 824 students still studying, 3 less than in 2020. If the number of students per supervisor includes only students studying at the university, the average number of students per supervisor is 3.0. If students who have interrupted their studies are included, the average of the CZU is 3.9. There has been a significant year-on-year increase in the number of doctoral graduates (81 in 2021, 42 in 2020). The number of graduates in 2021 is comparable to 2018 (86) and 2019 (83), while the extremely low number of graduates in 2020 was due to the extension of the study period by half a year as a result of the COVID-19 pandemic.

The number of newly appointed associate professors in 2021 has increased compared to 2020. There were 20 newly appointed associate professors, while 13 associate professors were appointed in 2020. The number of newly appointed professors was five in 2021 (6 appointment procedures were completed in 2020).

In 2021, a total of 1,229 scientific publications were published by CZU Praha staff, which are registered in the Web of Science and Scopus databases, which is 182 more than in 2020 and 319 more than in 2019. There were 1,137 articles published in the Web of Science database, 197 more than in 2020 and 411 more than in 2019. In contrast, the number of articles in the Scopus database (92) decreased year-on-year by 15 articles. This is 92 fewer articles than in 2019 and 115 fewer articles than in 2018.

When evaluating the publication activities according to the AIS (Advanced Impact Score), it can be seen that the number of articles in D1 (110) is practically identical to the number of articles in 2020 (113). This is an increase of 41% compared to 2017. The number of articles in Q1 increased year-on-year by 51 to 366 (a 16% increase). The number of articles also increased significantly in Q2 to 478 (up from 313 in 2020, a 53% increase). In 2021, articles in Q1 and Q2 accounted for a full 74.2% of the total number of articles on WoS. On the other hand, the number of articles dropped significantly in Q4 (from 98 to 89).

CZU ranked 4th among universities in the Czech Republic in terms of the percentage of articles in Q1 (53.04%) and improved by one place compared to 2020 (51.29%). CZU improved significantly compared to 2019 (7th place, 45.52%), 2018 (11th place, 38.02%) and 2010 (14th place, 28.57%). The number of articles classified in the first decile increased by 1.18% year-on-year to 13.12%, placing the CZU in third place among universities in the Czech Republic. In 2019 and 2018, CZU ranked 5th (9.23%) and 4th (9.78%) in this parameter, respectively. Compared to 2010, however, this is a significant increase, as in that year the CZU ranked 17th among Czech universities (6.13%). It is pleasing to note the steadily decreasing proportion of articles classified in Q4. While in 2004, a full 72.73% of articles were included in this category, in 2021 it was only 4.07%, putting CZU in the second place behind the Brno University of Technology.

In the evaluation of Module M1 of the 2017+ Methodology, a total of 44 outputs were evaluated for 2020. CZU received 3 „1" ratings and 9 „2" ratings, with a weighted average rating of 2.98 in 2020 (in 2019 it was 2.93 and in 2018 the weighted average was 2.87).

In 2021, the CZU staff participated in 22 articles published in journals classified in the „Nature Index" category. The following faculties contributed to these articles: FLD 12x (one shared with FTZ), FŽP 8x and FAPPZ 2x.

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