

State of scientific research in Finland 2024

Statistics on research funding, research personnel and scientific publishing



Research Council
of Finland

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Finnish research and innovation system



Research, development and innovation system

- Key RDI organisations
 - 14 universities
 - 24 universities of applied sciences
 - 12 government research institutes
 - Research and development units in companies
- The most significant organisations that fund research are the Research Council of Finland, Business Finland and different foundations and funds.
- The Research and Innovation Council is an advisory body chaired by the Prime Minister that acts in the interests of a research and innovation policy that supports well-being, education and economically, socially and ecologically sustainable growth and competitiveness.



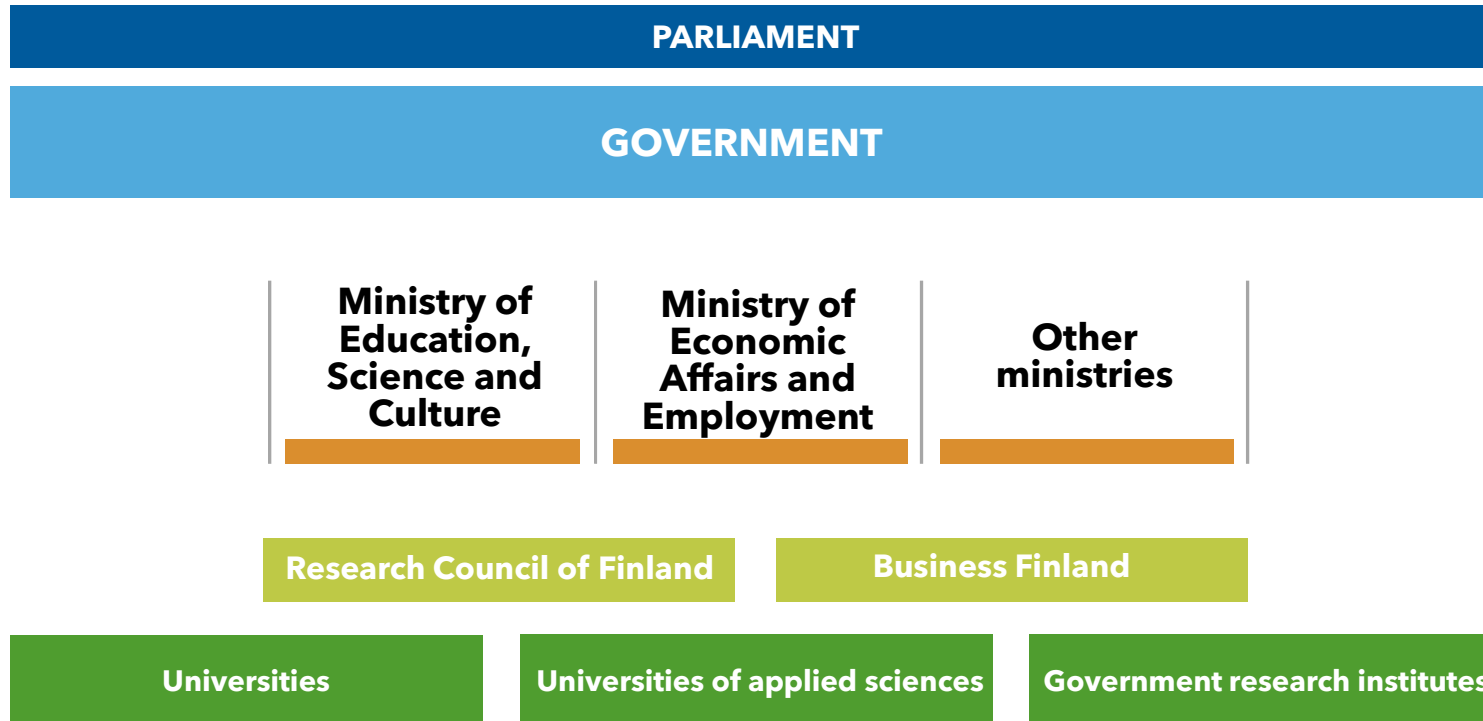
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Actors in the public RDI system



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- In addition to universities operating under the Ministry of Education, Science and Culture, the National Defence University operates under the defence administration, Högskolan på Åland operates on the Åland Islands, and the Police University College operates under the Ministry of the Interior.
- Strategic Research Council (SRC), established within the Research Council of Finland is presented here as part of Research Council of Finland.

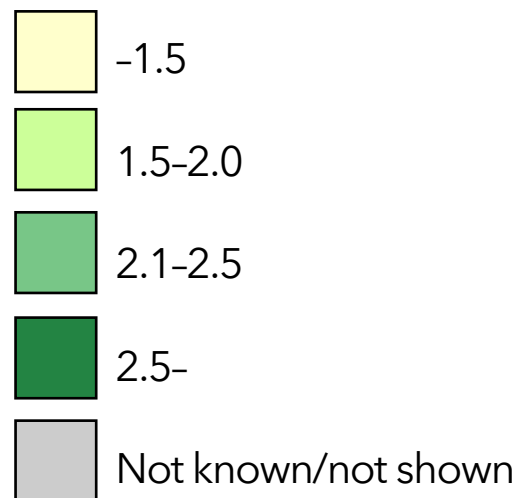


Research funding



Research and development expenditure as percentage of GDP

R&D expenditure as percentage of GDP (%)

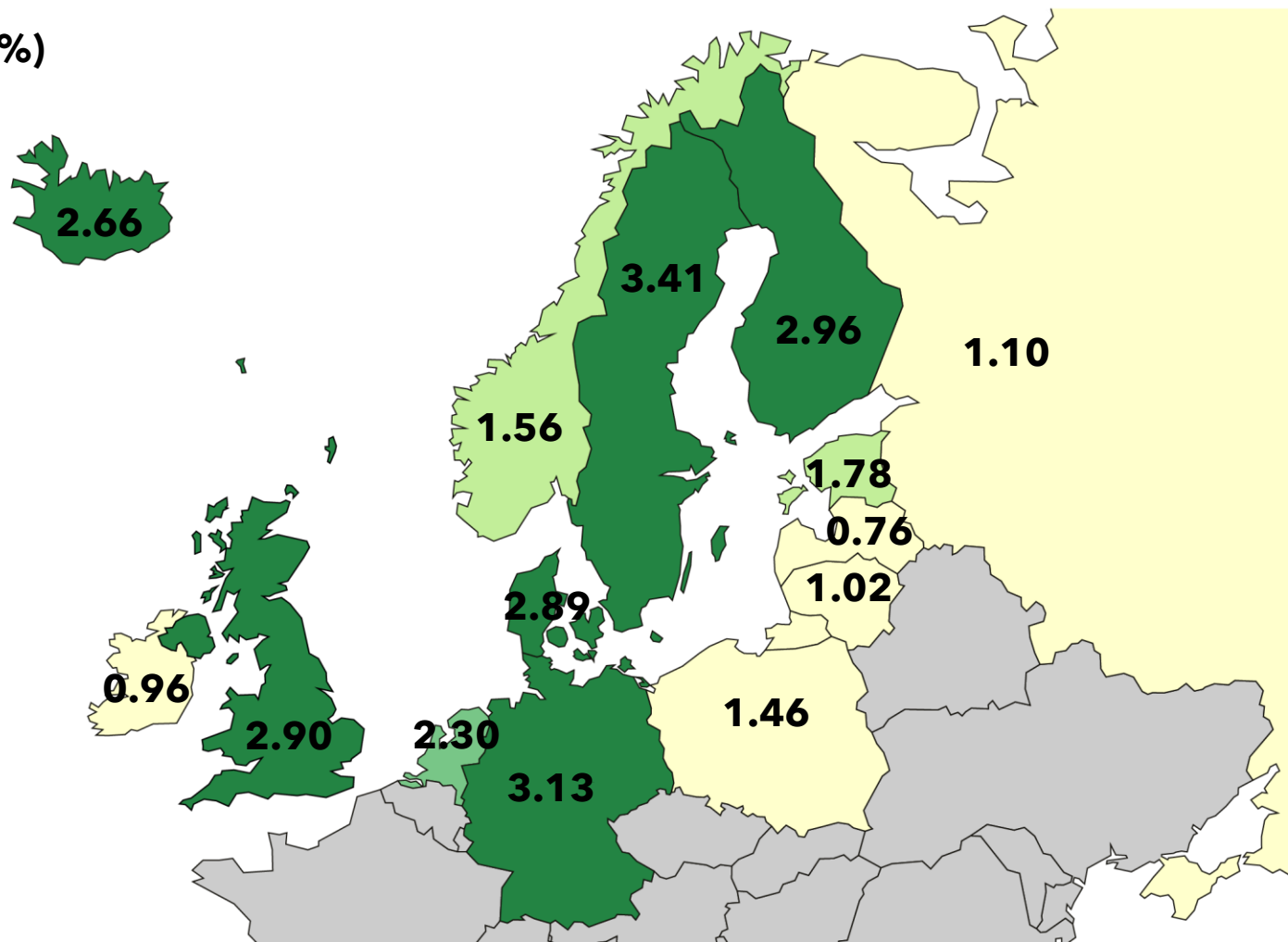


Averages for GDP percentage of R&D expenditure

EU: 2.11%

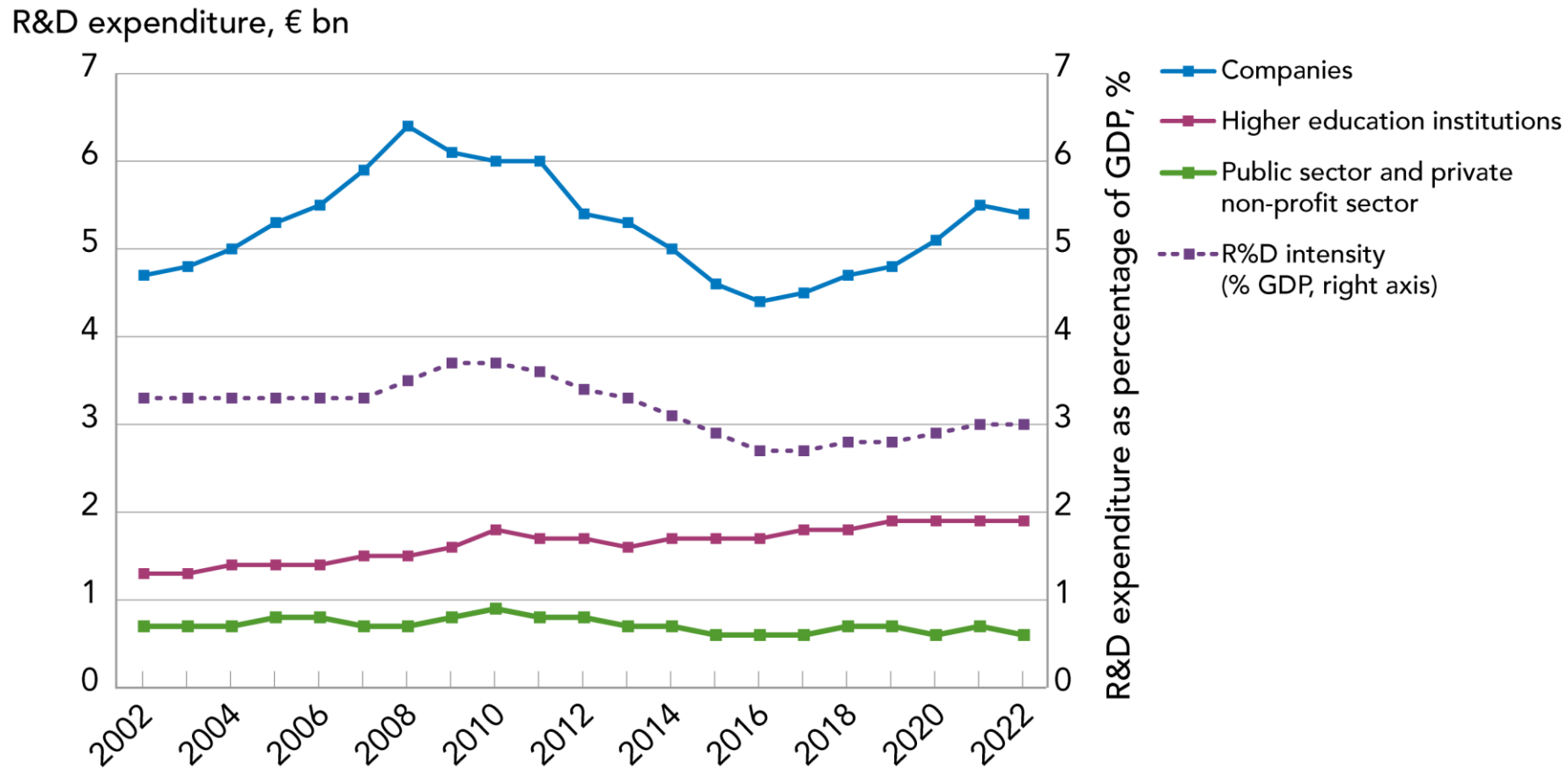
OECD: 2.73%

Data from 2022 or most recent year available.



Source: OECD Main Science and Technology Indicators (data published on 03/2024).

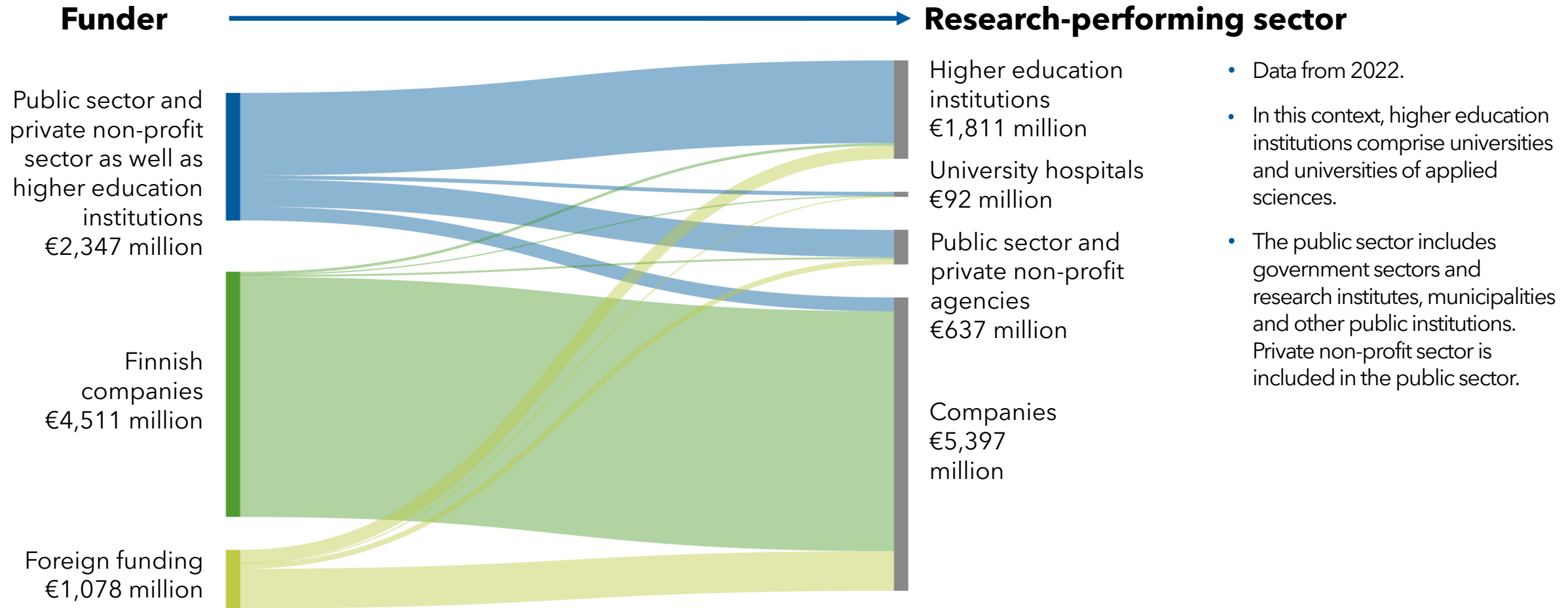
Finnish R&D expenditure and R&D expenditure as percentage of GDP



- In this context, higher education institutions comprise universities, university hospitals and universities of applied sciences.
- The public sector comprises central government branches and government research institutes, municipalities (since 2007) and other public institutions. Private non-profit sector is included in the public sector.

Source: Statistics Finland, research and development.

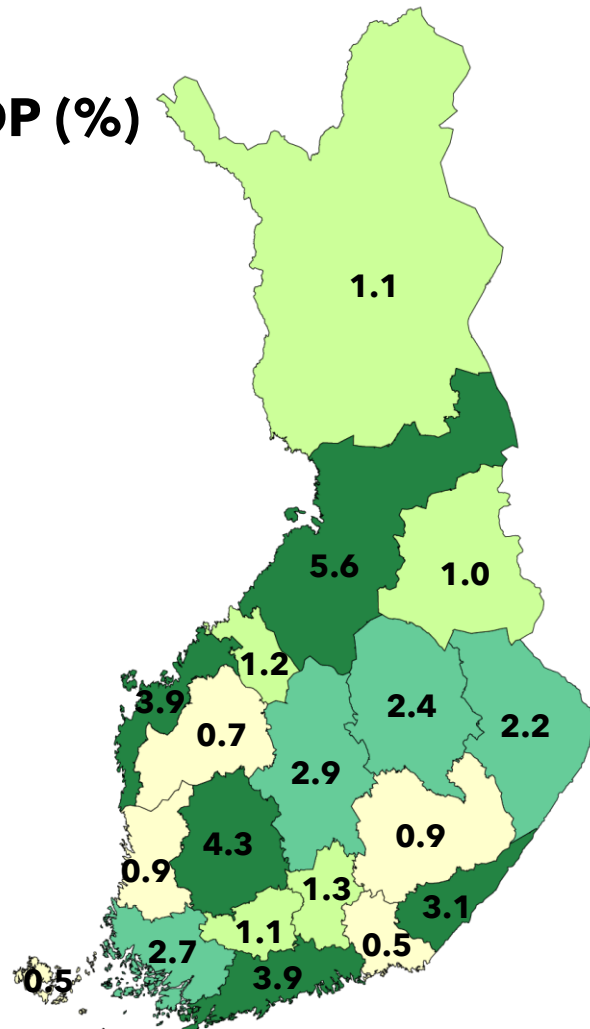
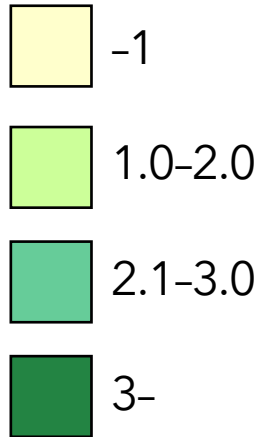
Flow of R&D funds in Finland



Source: Statistics Finland, Research and development.

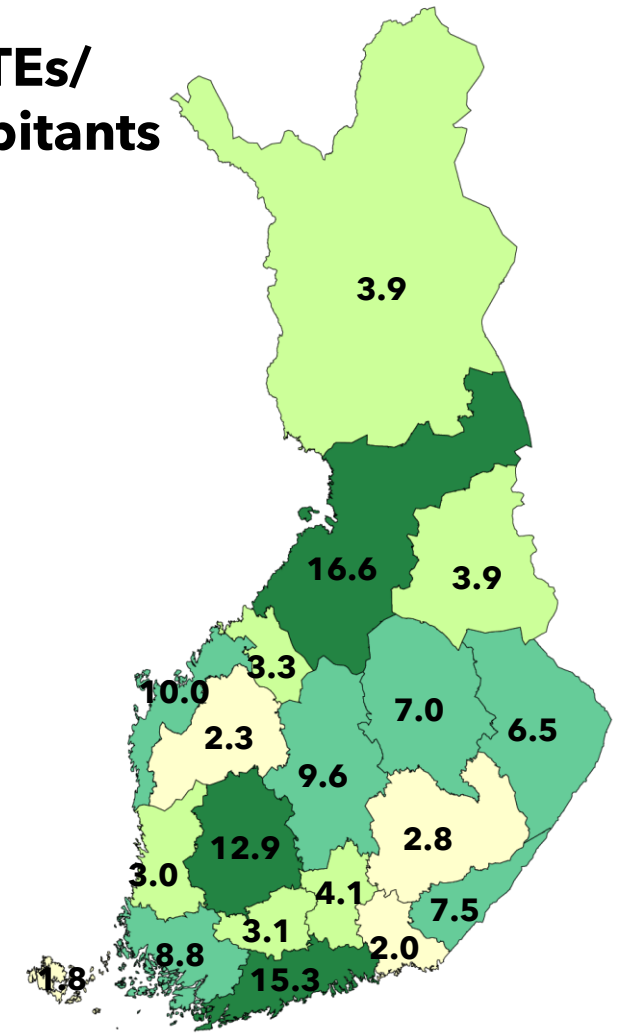
Research and development by region

R&D expenditure as percentage of GDP (%)



- Data from 2021 and 2022.
- The maps show the regional borders in 2019.

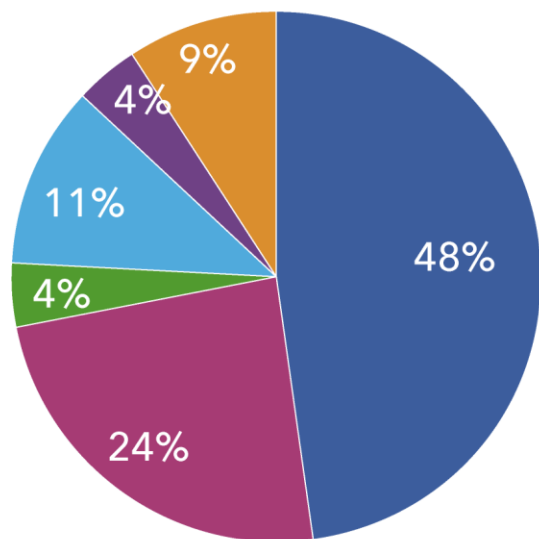
Research FTEs/ 1,000 inhabitants



Sources: Statistics Finland, Research and Development, Regional National Accounts and Demographic Structure 2022.

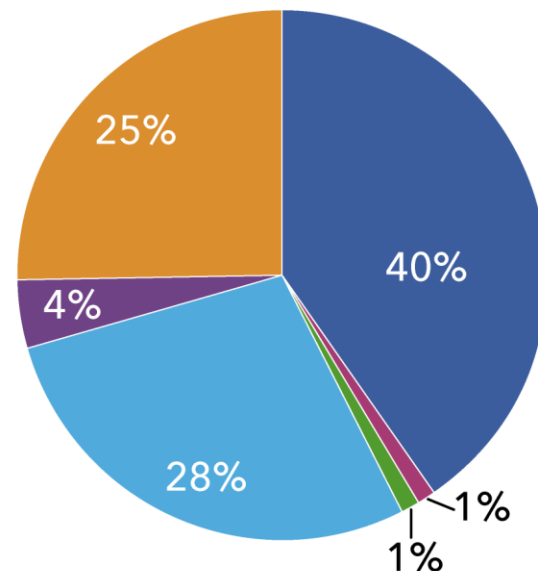
R&D funding sources in higher education institutions and government research institutes

Universities



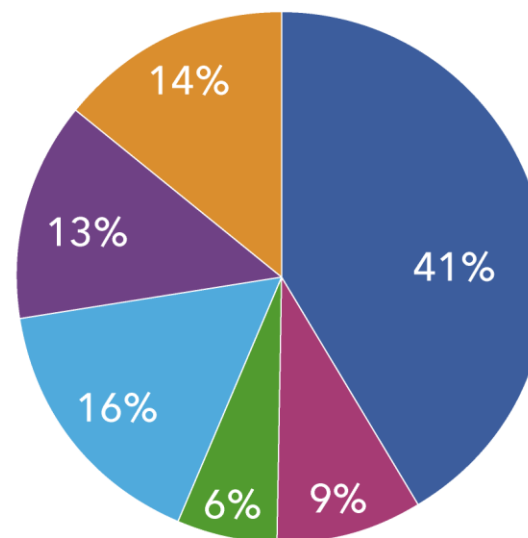
**Total R&D funding:
€1,547.2 million**

Universities of applied sciences



**Total R&D funding:
€260.3 million**

Government research institutes



**Total R&D funding:
€468,5 million**

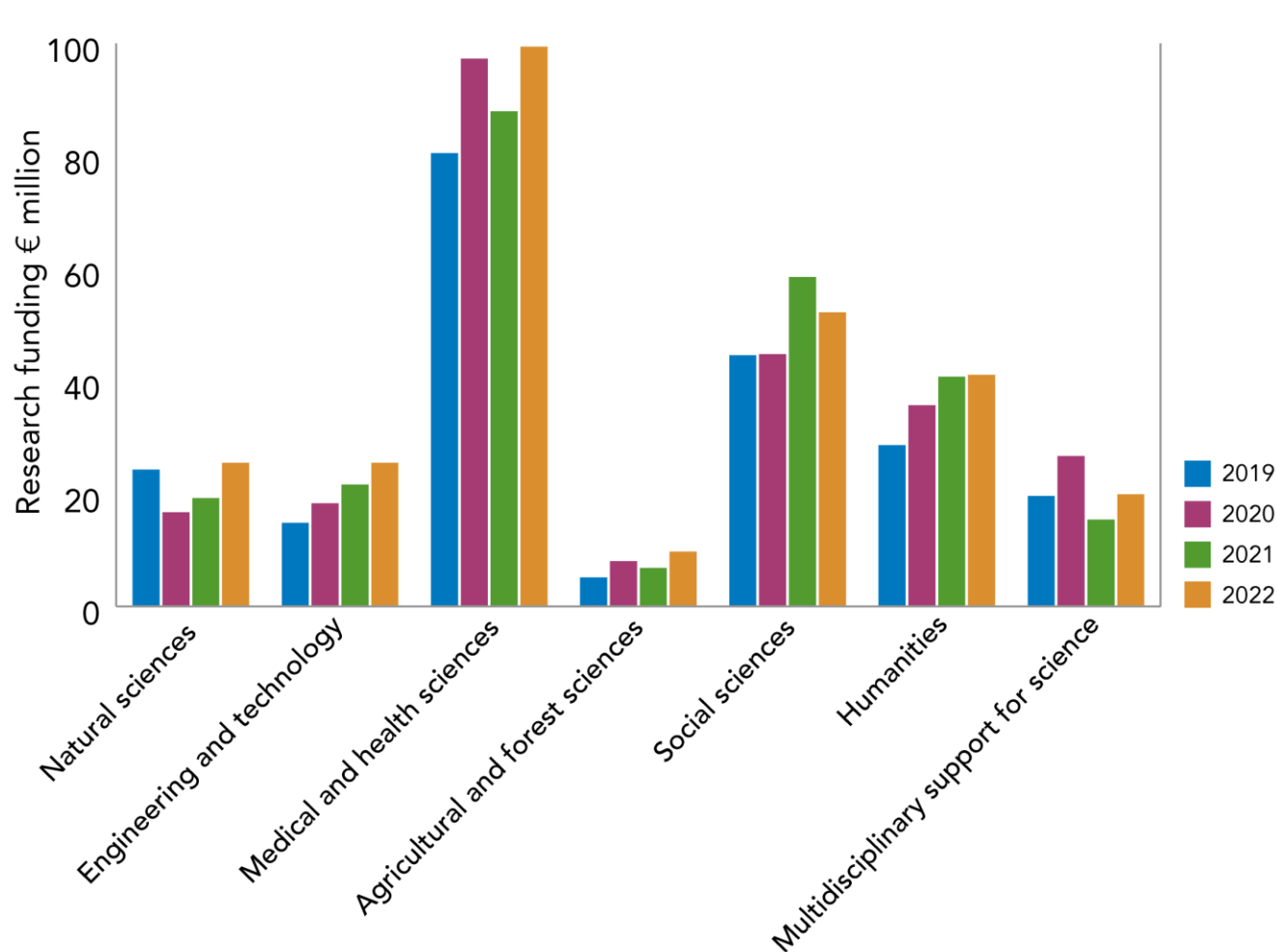
- Core funding and own resources
- Other domestic (excl. companies)
- Research Council of Finland
- Companies (Finnish and foreign)
- Business Finland
- Foreign funding sources

- Data from 2022.
- Other national funding includes Finnish private funds and foundations, municipalities, ministries (other than basic government funding and funding distributed through the RCF and BF), other public funding and Finnish higher education institutions.
- Corporate funding includes Finnish and foreign companies.
- Other foreign funding includes funding from the EU's research and innovation framework programmes, other EU funding, foreign funds and foundations, international organisations and other foreign funding.

Source: Education Statistics Finland Vipunen, Higher education and R&D, Research and development (Statistics Finland).

Research funding granted by foundations and funds by main discipline

A member survey by the Association of Finnish Foundations used as a data source, in which the response rate was 87%. The funding of the foundations that responded to the survey was approximately 94% of the estimated support for foundation in 2022.



Total research funding by foundations, million €	
2019	218
2020	248
2021	268
2022	273

- The data does not include funding from foundations and funds under the category 'Other support for science' (EUR 18 million in 2021; EUR 31 million in 2020; EUR 28 million in 2019 and EUR 23 million in 2018).
- Other support for science includes general support for scientific work, e.g. residency activities; support for universities and research institutes, e.g. premises, administration, ICT, research infrastructures (which cannot be put into a specific category), scientific libraries, the foundations' own research work, investments in scientific infrastructures and other support for science.
- Multidisciplinary support for science means funding for scientific activities that cross the boundaries of the main disciplines.

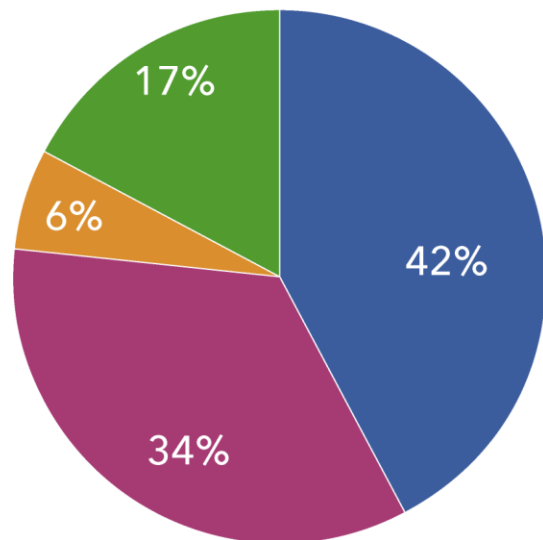
Source: The Association of Finnish Foundations 2022, <https://saatiotrahastot.fi/wp-content/uploads/2023/09/Selvitys-saatiotuesta-2022.pdf>

Research personnel



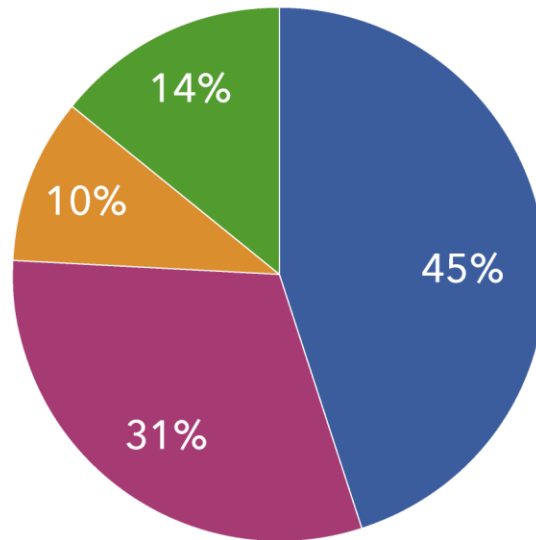
Educational level of R&D personnel

Higher education institutions



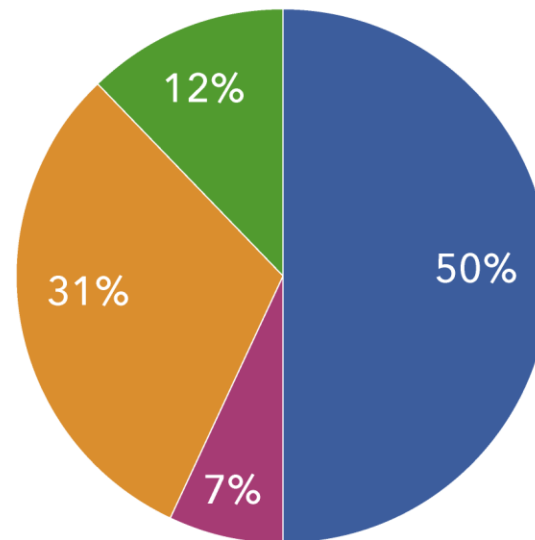
Number of R&D personnel: 35,353, women 52%

Public sector and private non-profit agencies

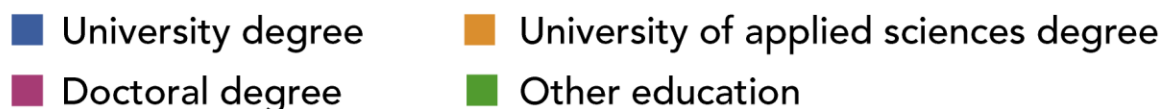


Number of R&D personnel: 7,633, women 48%

Companies



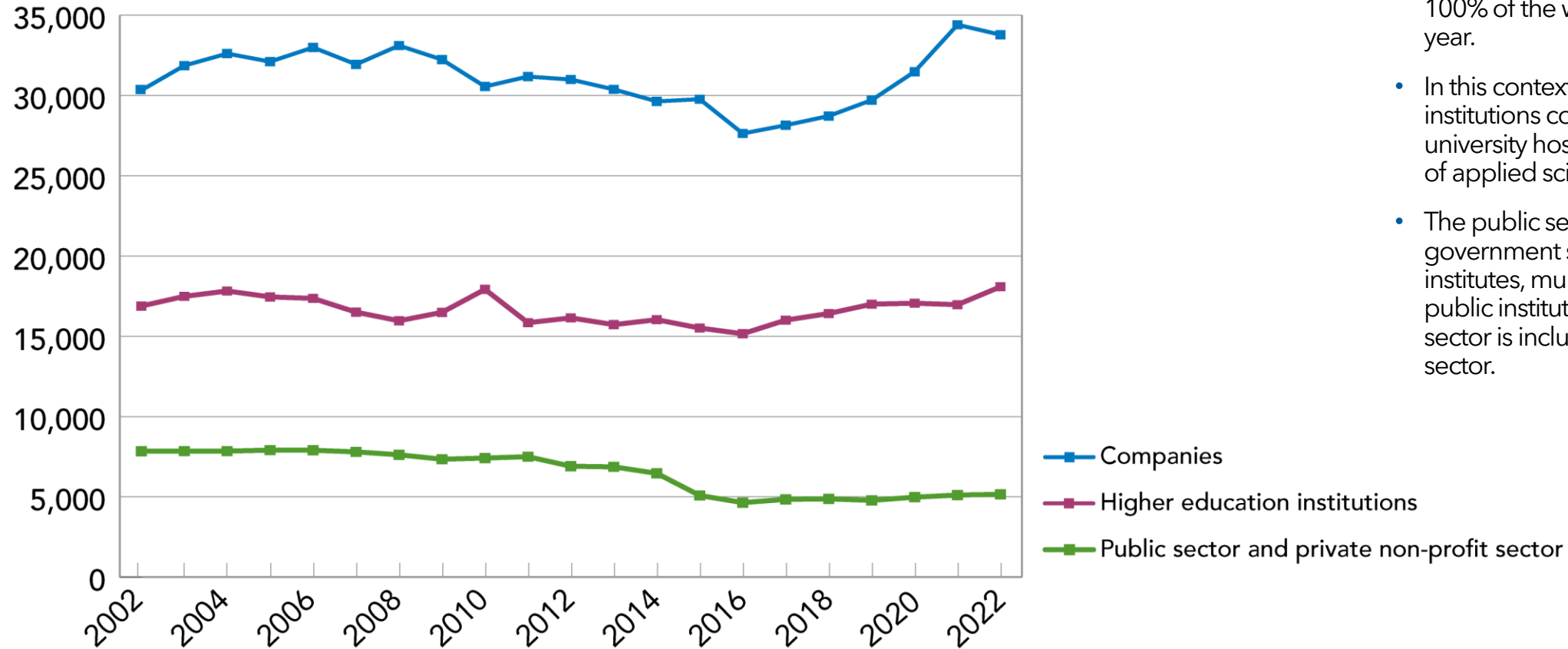
Number of R&D personnel: 43,951, women 21%



- Data from 2022.
- In this context, higher education institutions comprise universities, university hospitals and universities of applied sciences.
- The public sector includes government sectors and research institutes, municipalities and other public institutions. Private non-profit agencies are included in the public sector.
- University degrees includes bachelor's and master's degrees, specialist medical training and licentiate degrees. Higher education degrees include bachelor's and master's degrees.

Research FTEs in Finland

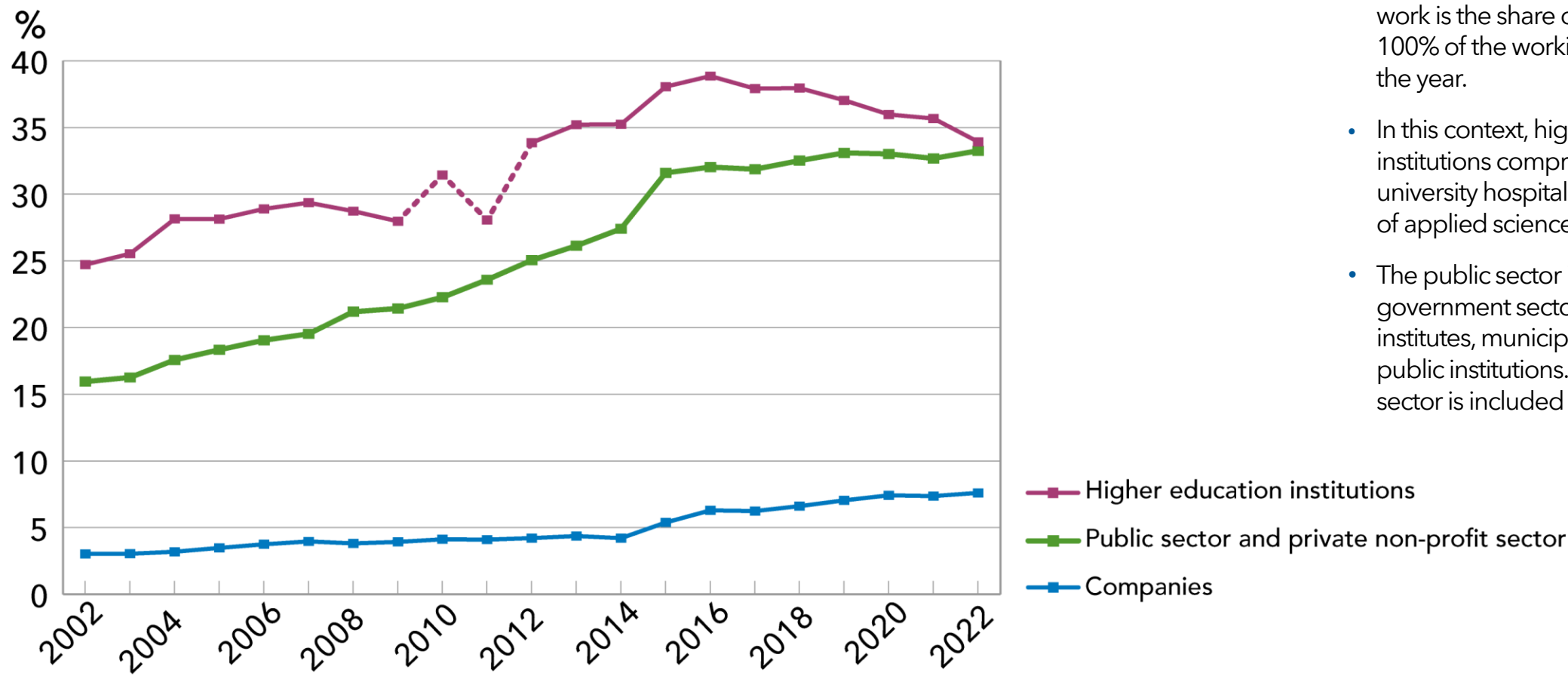
Research FTEs



- The full-time equivalent (FTE) of R&D work is the share of R&D work from 100% of the working hours during a year.
- In this context, higher education institutions comprise universities, university hospitals and universities of applied sciences.
- The public sector includes government sectors and research institutes, municipalities and other public institutions. Private non-profit sector is included in the public sector.

Source: Statistics Finland, Research and development

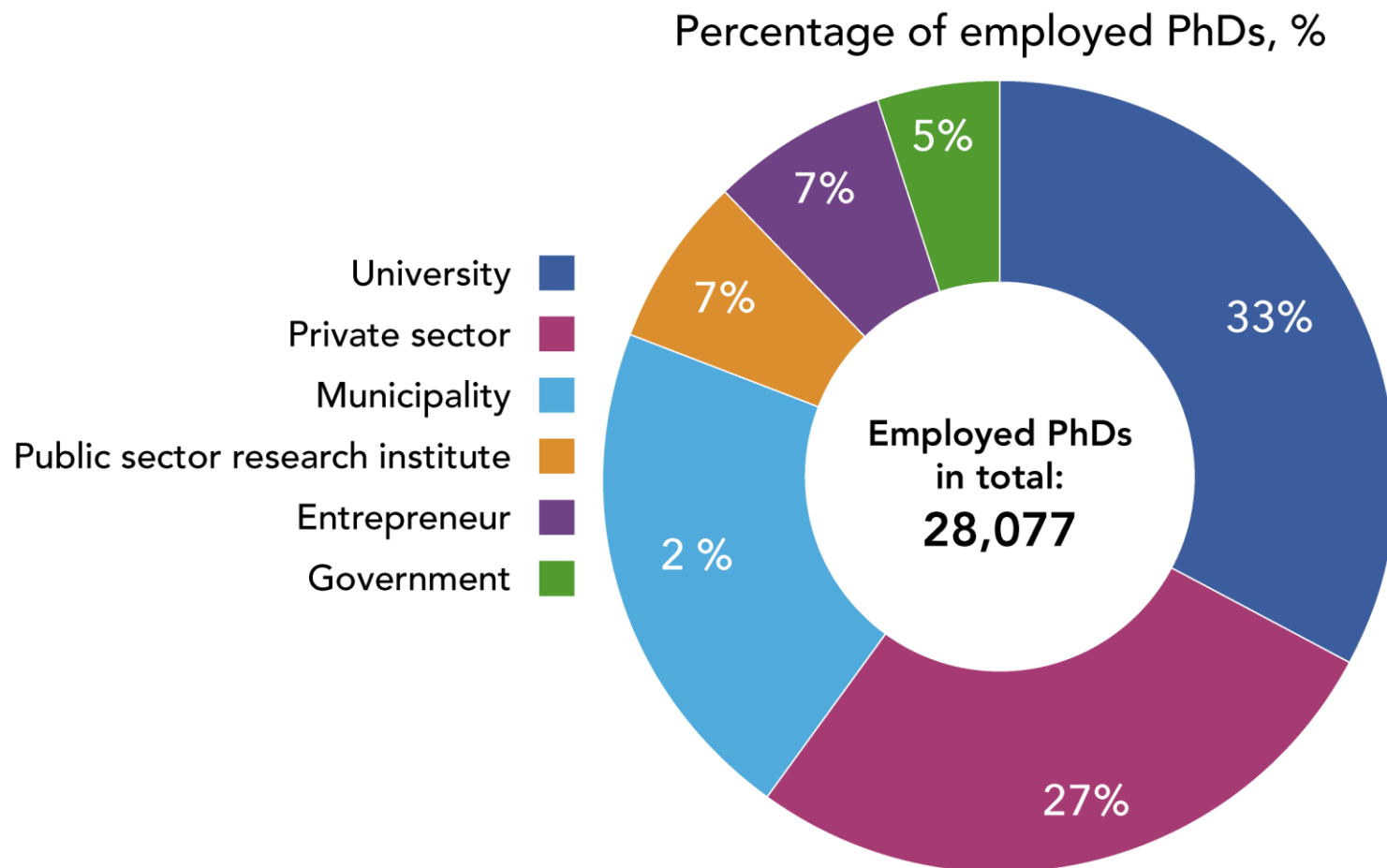
PhD's research FTEs as proportion of total research FTEs



- The full-time equivalent (FTE) of R&D work is the share of R&D work from 100% of the working hours during the year.
- In this context, higher education institutions comprise universities, university hospitals and universities of applied sciences.
- The public sector includes government sectors and research institutes, municipalities and other public institutions. Private non-profit sector is included in the public sector.

Source: Statistics Finland, Research and development.

Distribution of doctoral degrees by employer

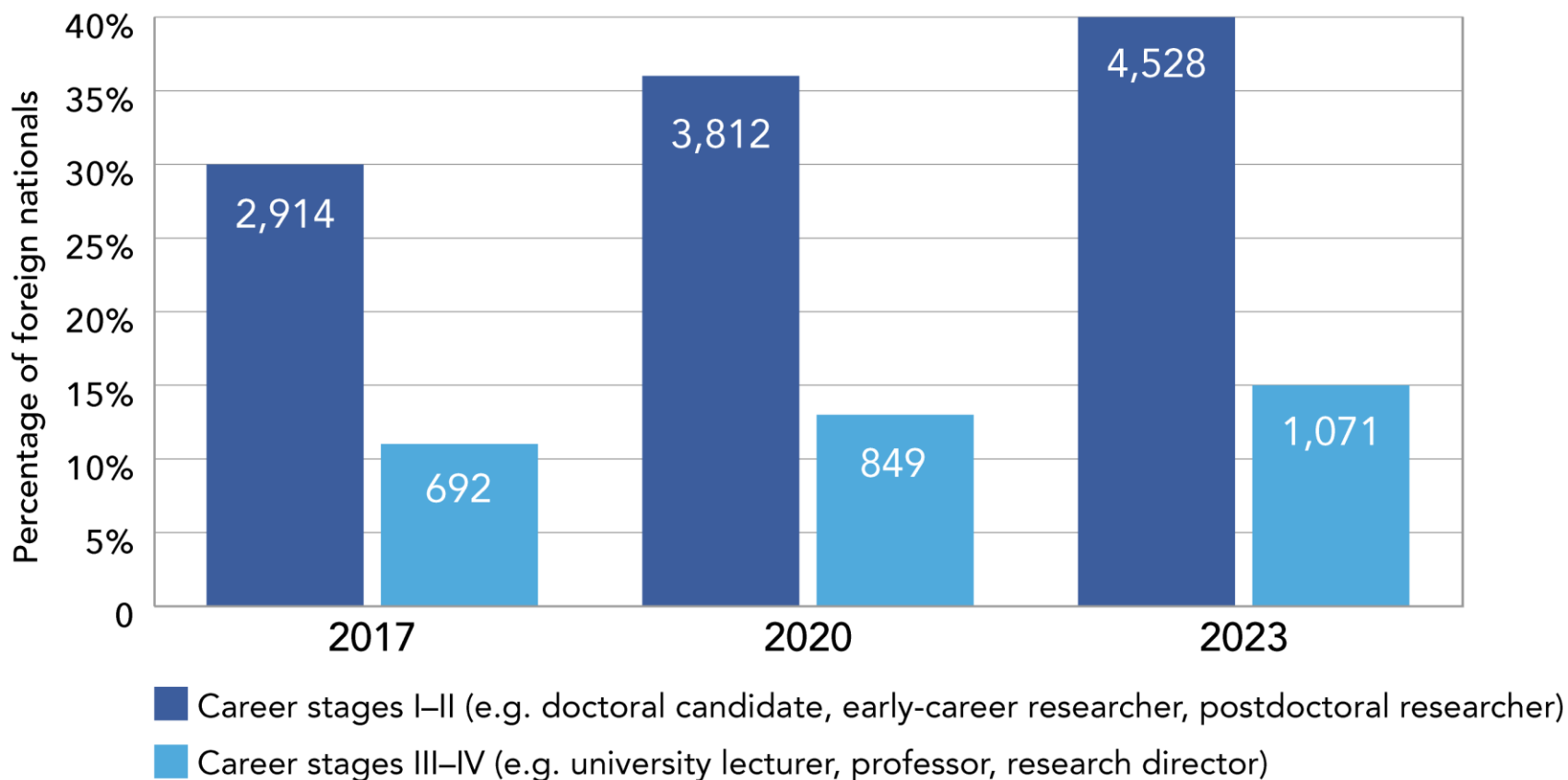


- Data from 2020.
- The data includes doctors aged 25–64 working in Finland.

Source: Education Statistics Finland Vipunen, Higher education and R&D, Human resources in science and technology.

Foreign teaching and research personnel in universities

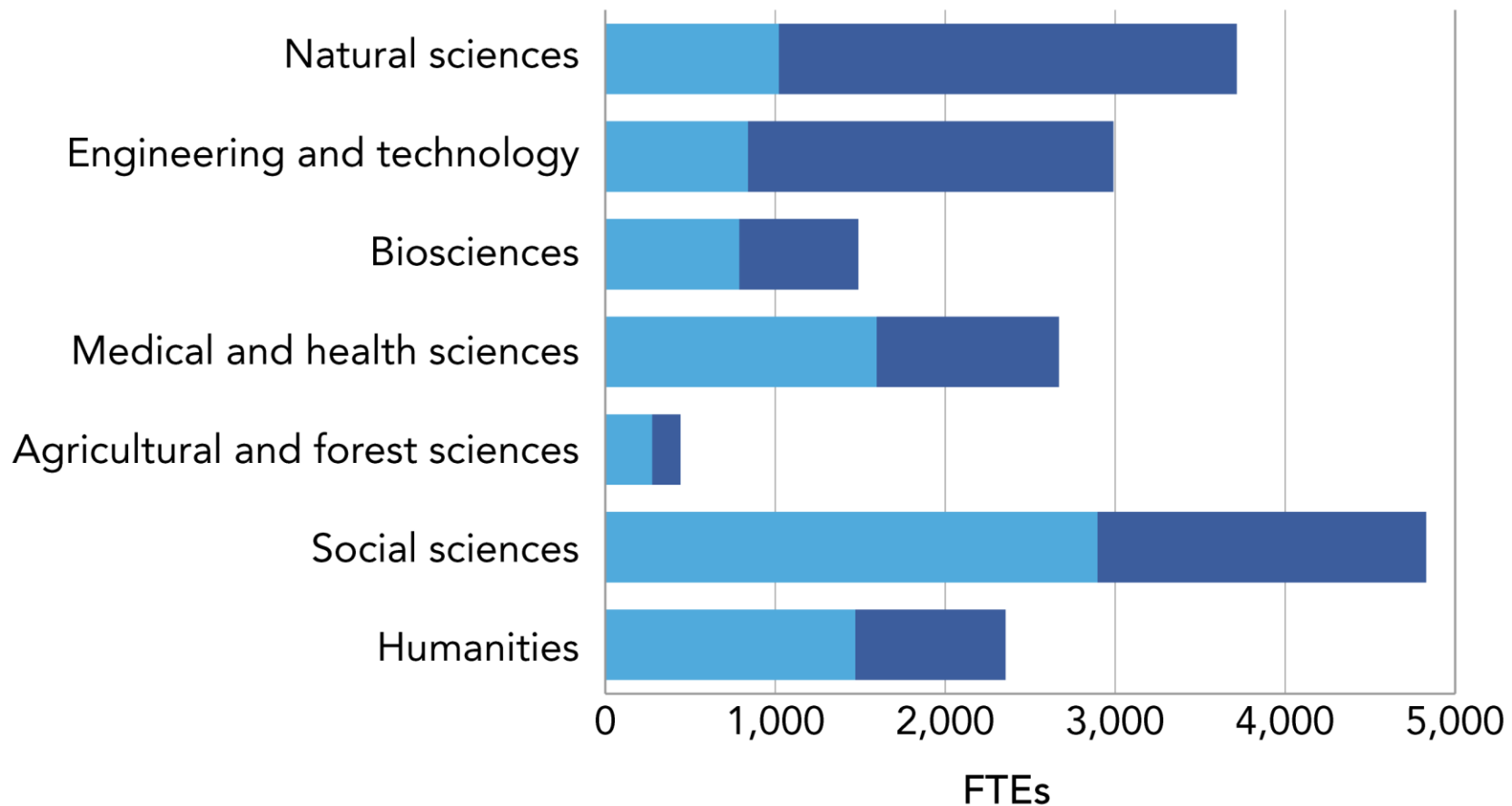
The proportion of foreign teaching and research personnel of the entire teaching and research personnel. The figures in the bars show the FTEs of foreign nationals.



FTE figures of university teaching and research staff do not include those working on scholarships. Universities also have different practices regarding which positions are included in different career stages.

Source: Education Statistics Finland Vipunen, University Education, Personnel.

University teaching and research personnel by gender and discipline

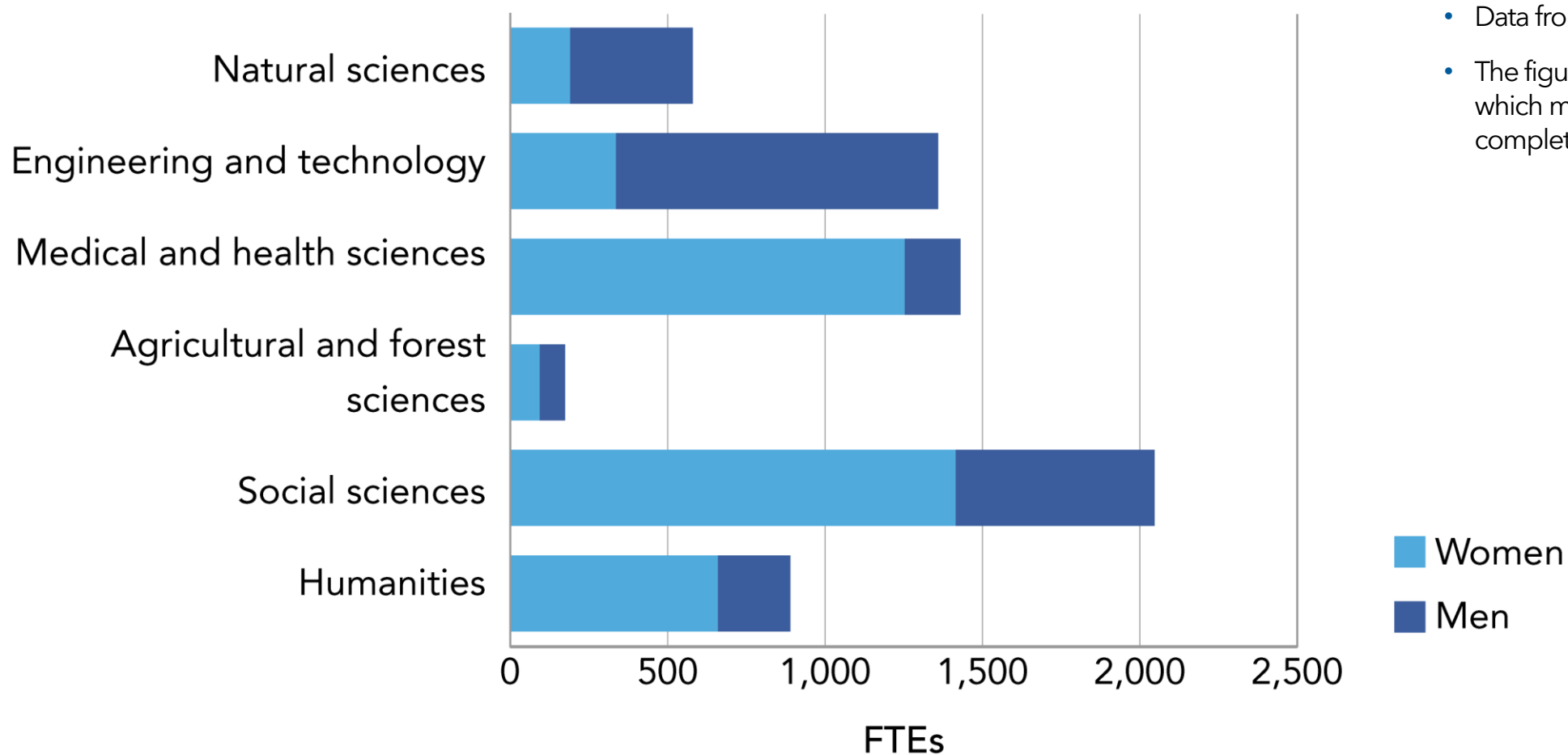


- Data from 2023.
- FTE figures of university teaching and research staff do not include those working on scholarships.

Women
Men

Source: Education Statistics Finland Vipunen, University Education, Personnel.

University of applied sciences teaching and research personnel by gender and discipline



- Data from 2023.
- The figure shows the disciplines in which more than 50 FTEs were completed.

Source: Education Statistics Finland Vipunen, University of applied sciences education, Personnel.

Personnel of government research institutes



- Data from 2022.
- The research FTEs of the Radiation and Nuclear Safety Authority are not presented, as they were four or fewer in 2022.

■ Research FTE
■ Other FTE

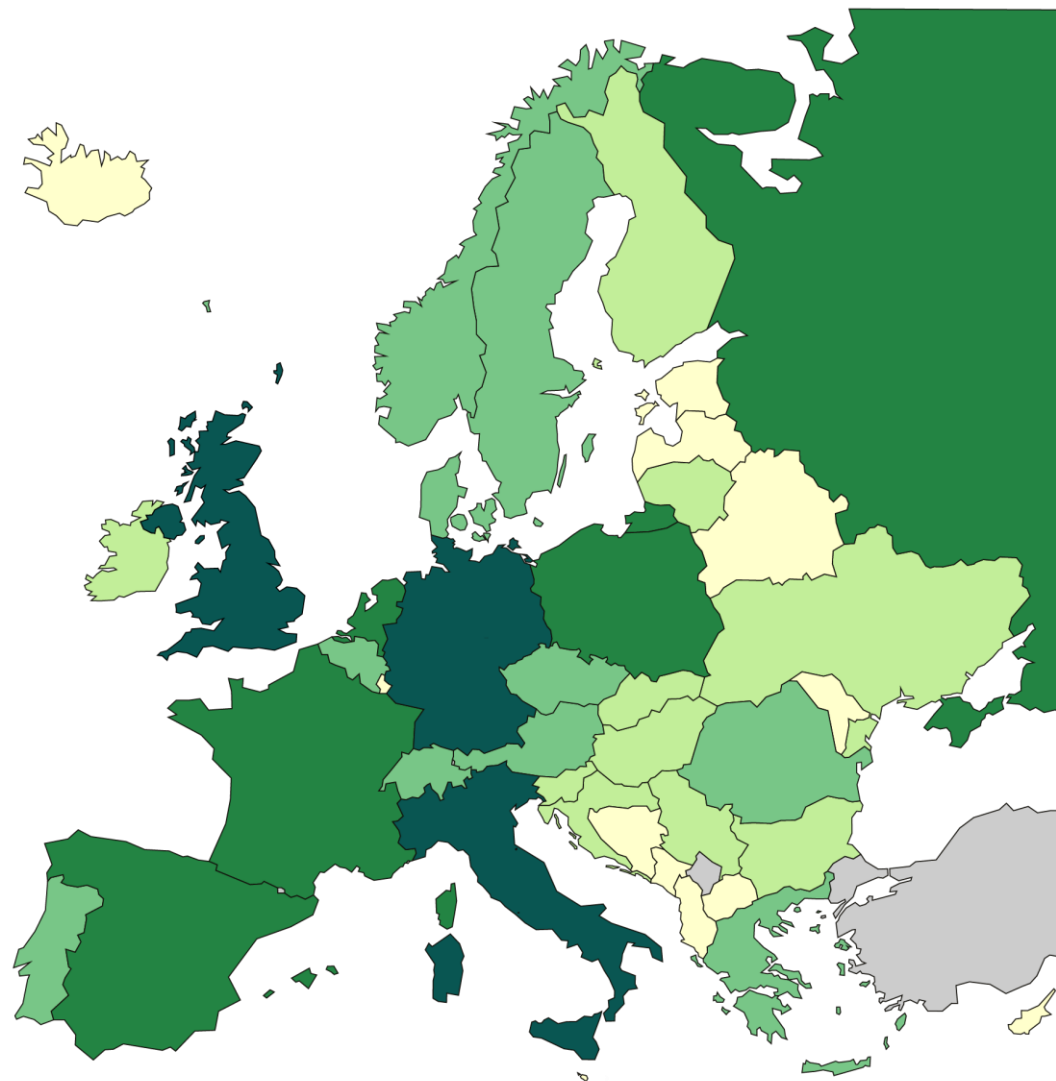
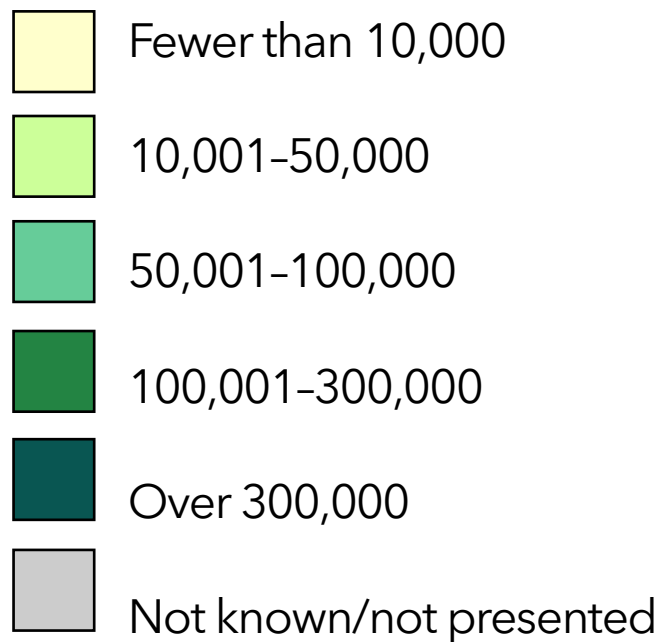
Sources: Education Statistics Finland Vipunen, Higher education and R&D, annual reports of research institutes for 2022.

Scientific publishing



Number of scientific publications in European countries

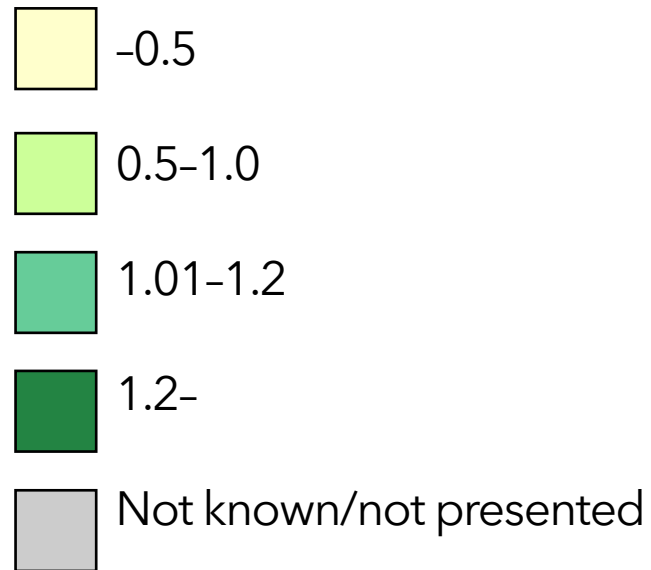
Number of publications in 2018-2021



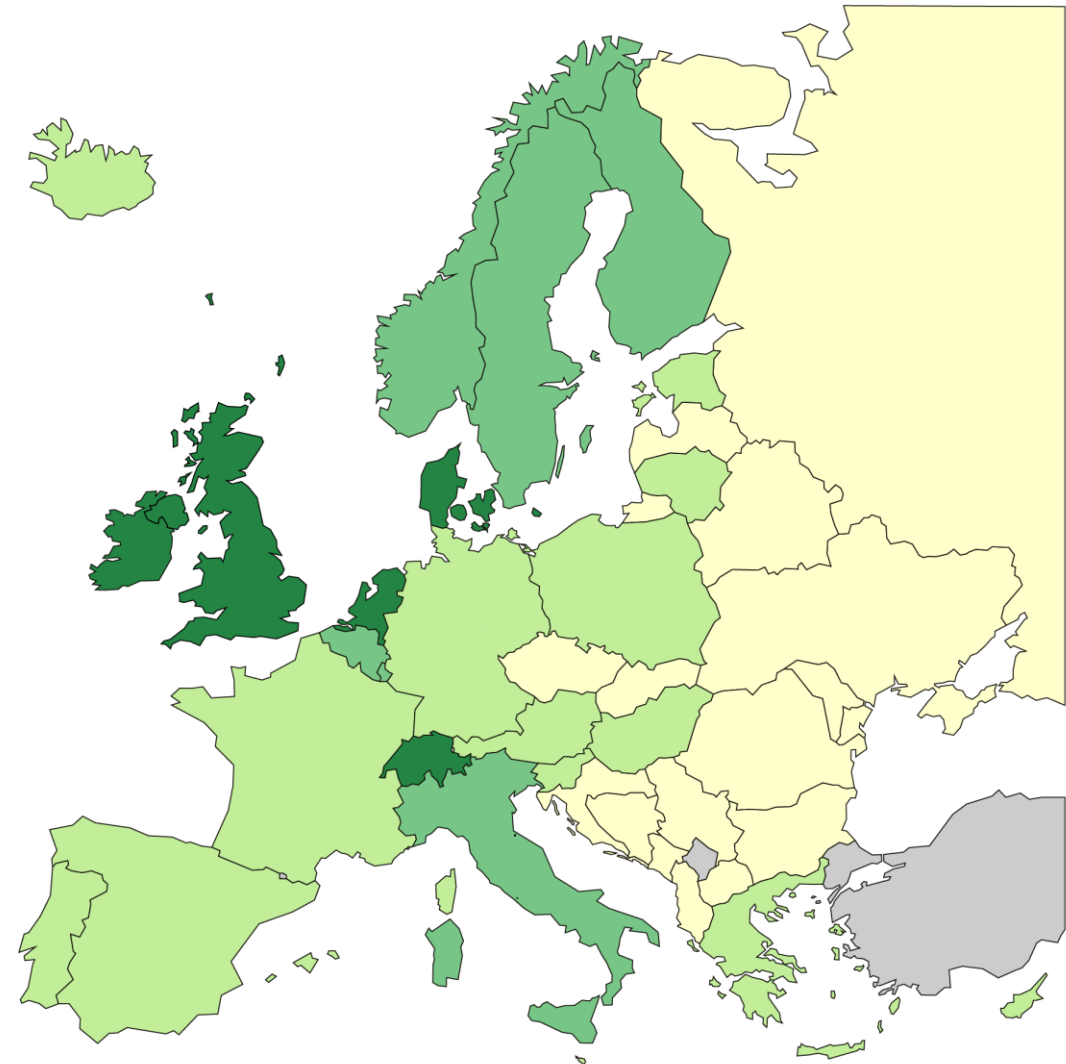
Source: Web of Science based data from Clarivate Analytics, bibliometric calculations CSC - IT Center for Science Ltd, 2024.

Scientific impact of publications in European countries

Top 10 index in 2018-2021

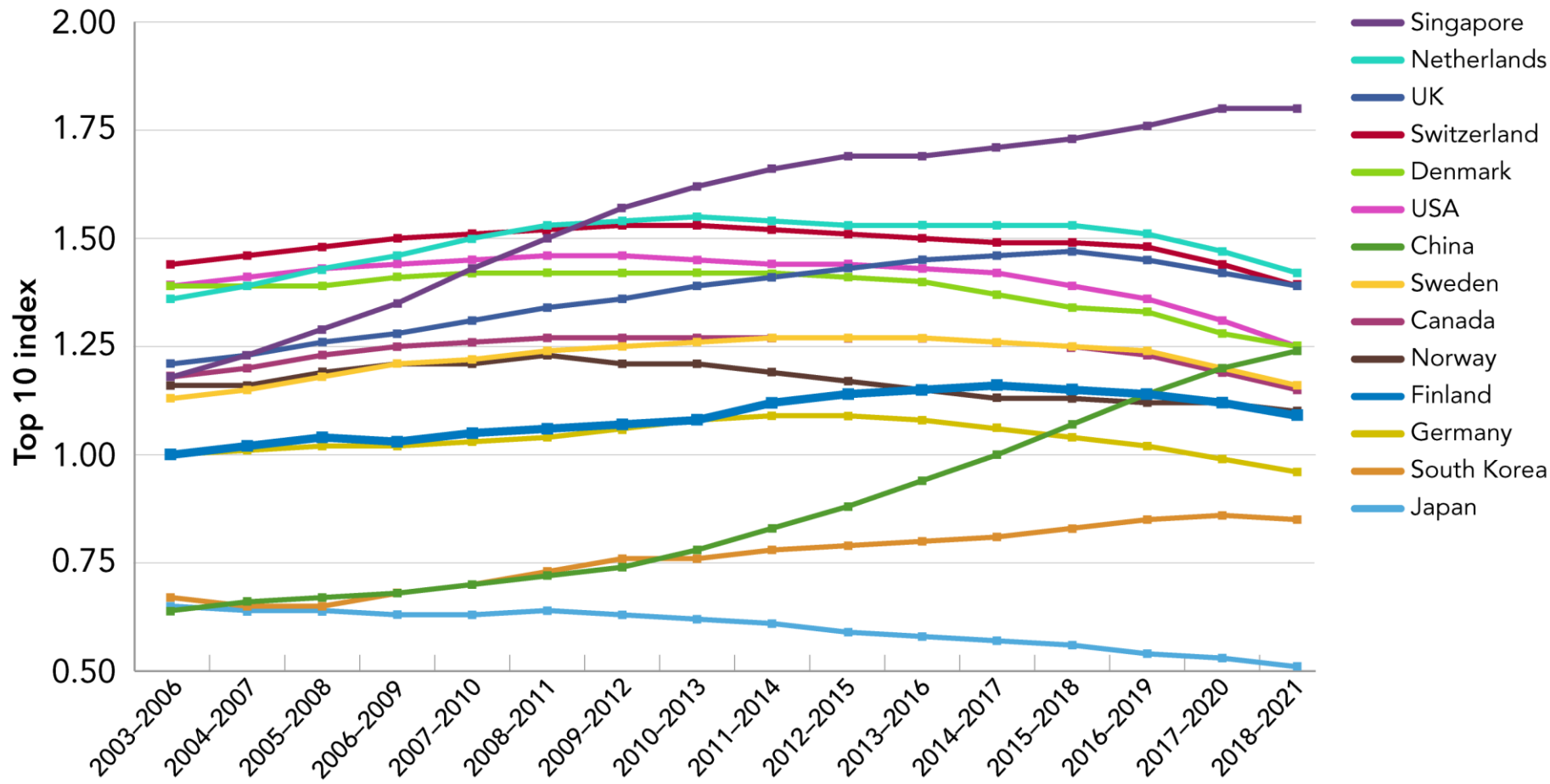


The index describes the proportion of the most cited publications; the global average in each discipline is 1.0. If the index is above 1, the publication is cited more than the global average.



Source: Web of Science based data from Clarivate Analytics, bibliometric calculations CSC - IT Center for Science Ltd, 2024.

Development of scientific impact of publications in Finland and reference countries

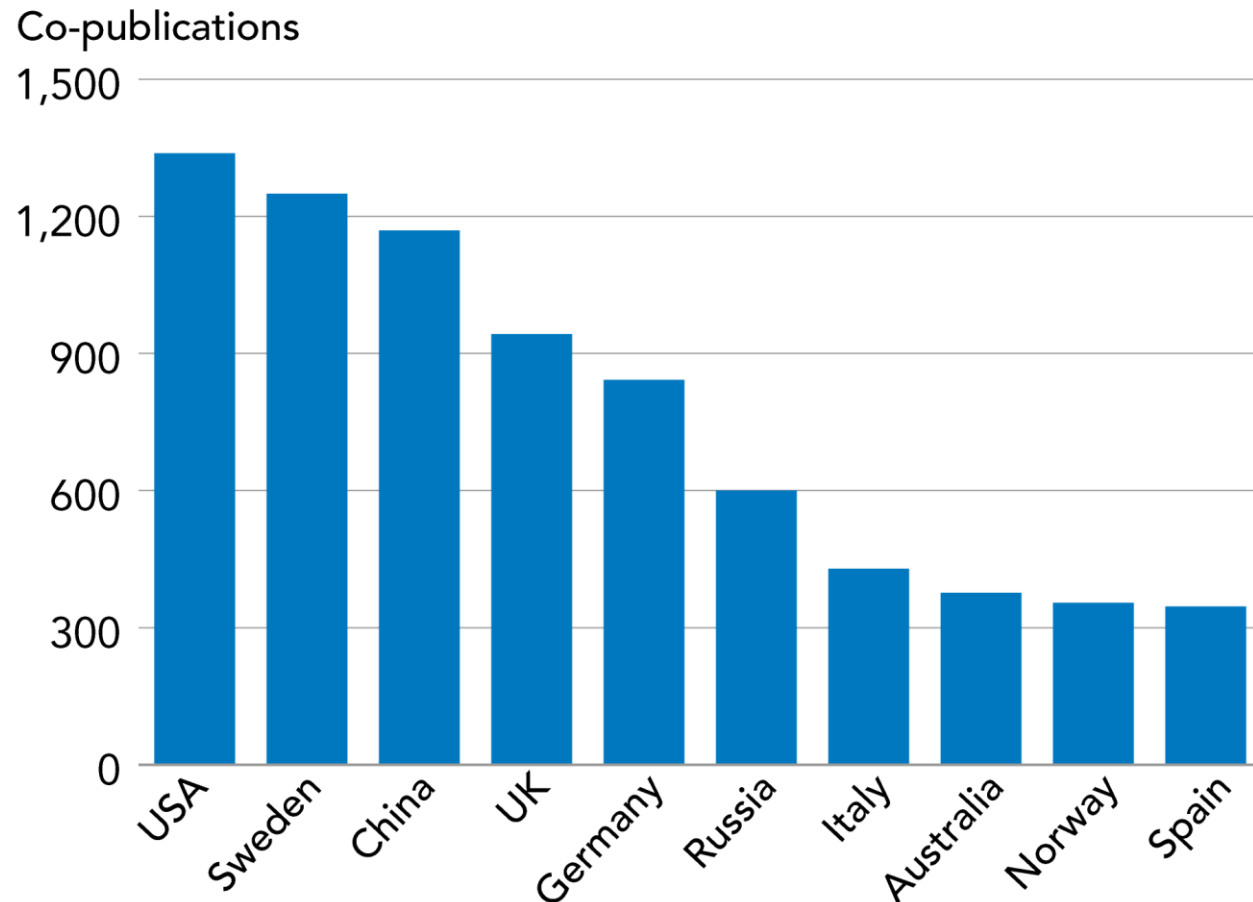


The index describes the proportion of the most cited publications; the global average in each discipline is 1.0. If the index is above 1, the publication is cited more than the global average.

Source: Web of Science based data from Clarivate Analytics, bibliometric calculations CSC - IT Center for Science Ltd, 2024.

Top 10 bilateral partner countries in Finland's international co-publishing

The graph shows the number of co-publications with Finland in 2018-2021.



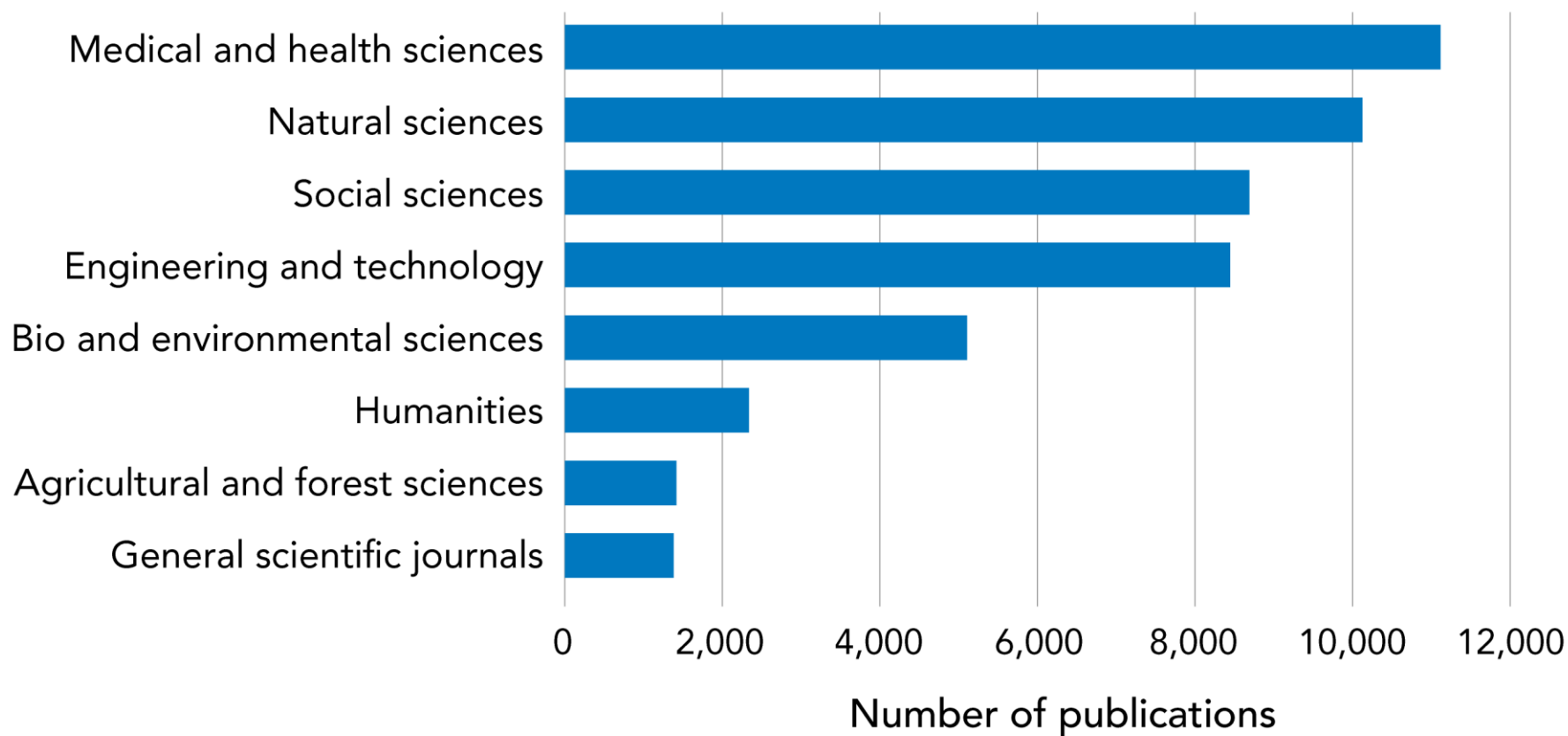
The top 10 index describes the proportion of the most cited publications; the global average is 1.0. If the index is above 1, the publication is cited more than the global average.

Country	Top 10 index for international co-publications with Finland
United States	1.56
Sweden	1.08
China	1.48
United Kingdom	1.34
Germany	1.01
Russia	0.57
Italy	1.38
Australia	1.54
Norway	1.01
Spain	1.11

Source: Web of Science based data from Clarivate Analytics, bibliometric calculations CSC - IT Center for Science Ltd, 2024.

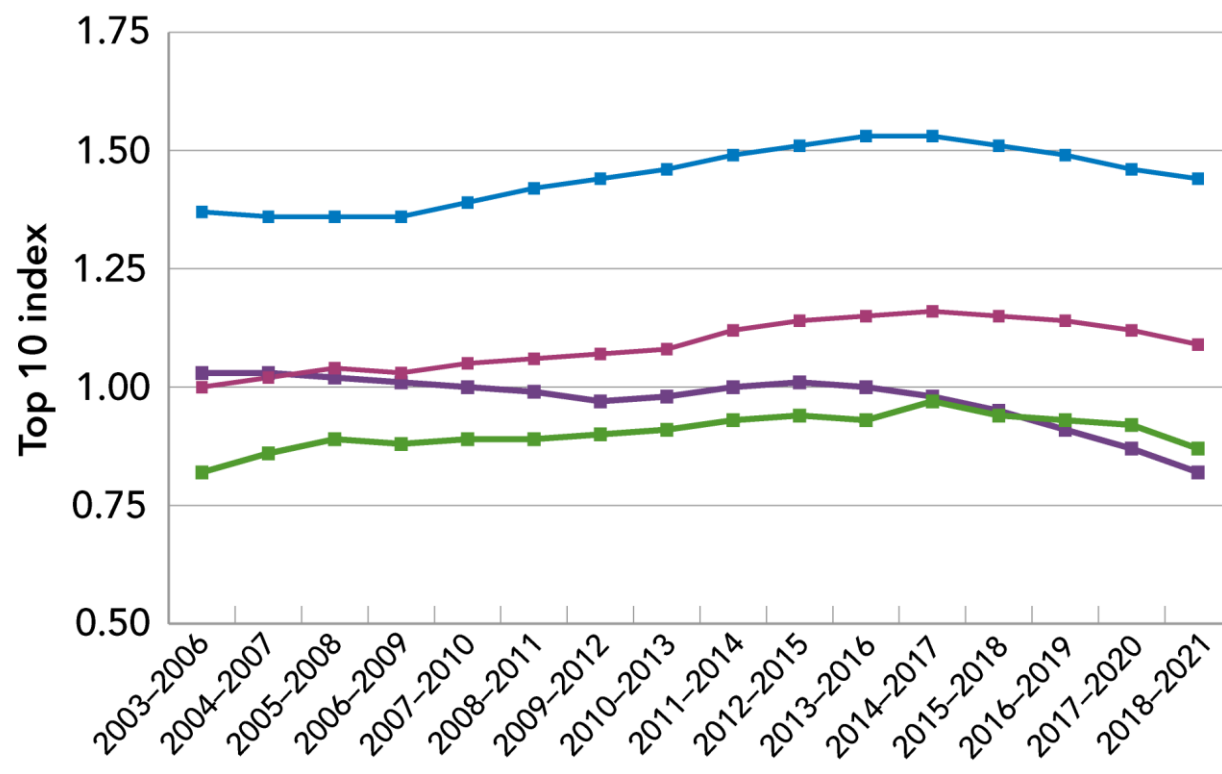
Number of publications in Finland by discipline

Finland's total publication volume for the four-year period 2018–2021 was 48,606 publications.

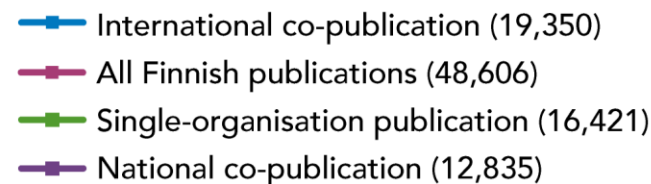


In particular, publications in many fields of social sciences and humanities are inadequately represented in the Web of Science (WoS) based material, so the number of WoS publications does not give a real overview of the scope of scientific publications in these fields.

Development of scientific impact of Finnish publications

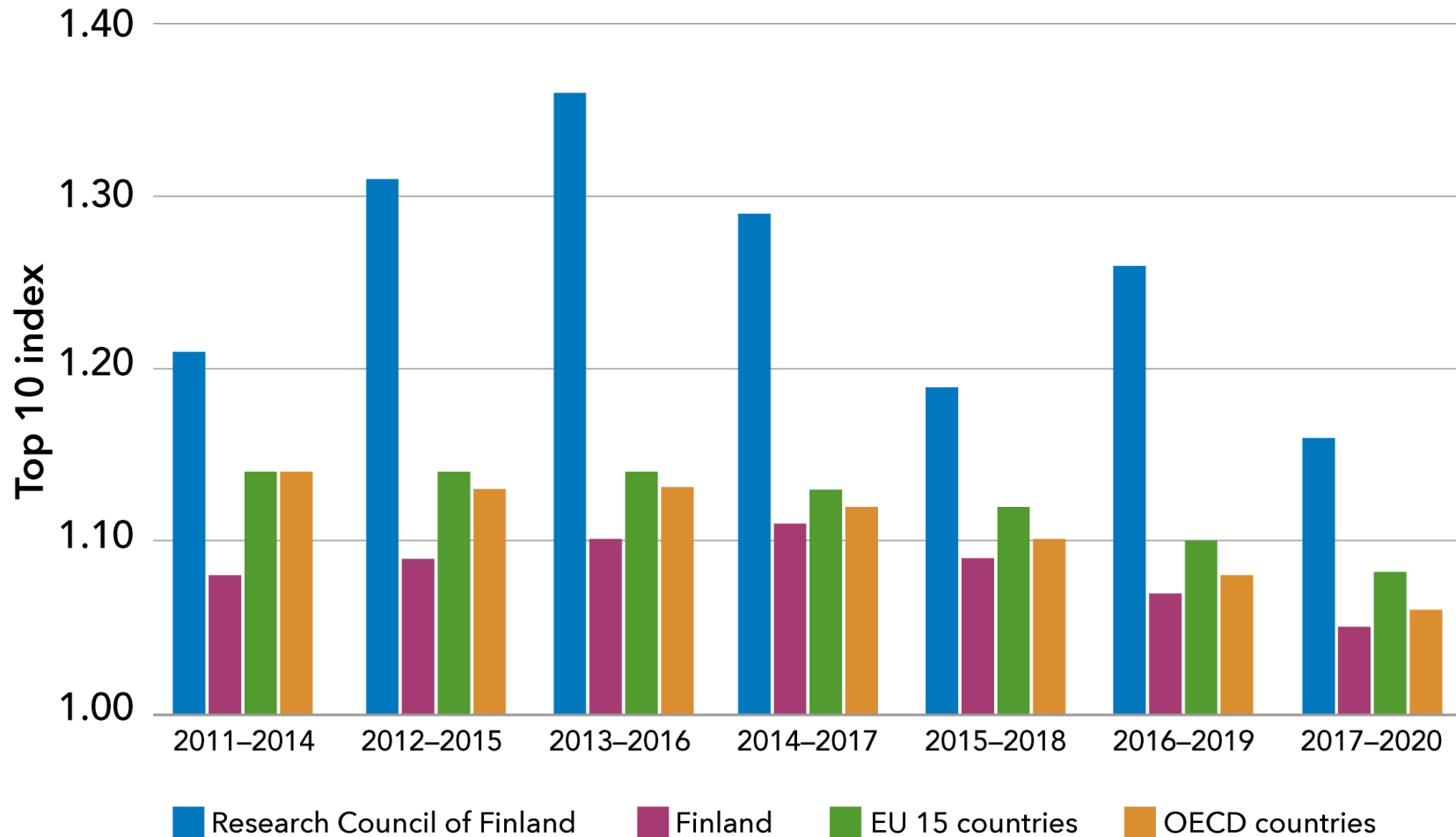


- The top 10 index describes the proportion of the most cited publications; the global average is 1.0. If the index is above 1, the publication is cited more than the global average.
- At least one of the authors of an international co-publication is from outside Finland. The authors of a national co-publication are from at least two different Finnish organisations. All authors of one organisation’s publication work in the same Finnish organisation.
- The label numbers are the number of publications in Finland during the four-year period 2018-2021.



Source: Web of Science based data from Clarivate Analytics, bibliometric calculations CSC – IT Center for Science Ltd, 2024.

Scientific impact of publications of projects funded by the Research Council of Finland

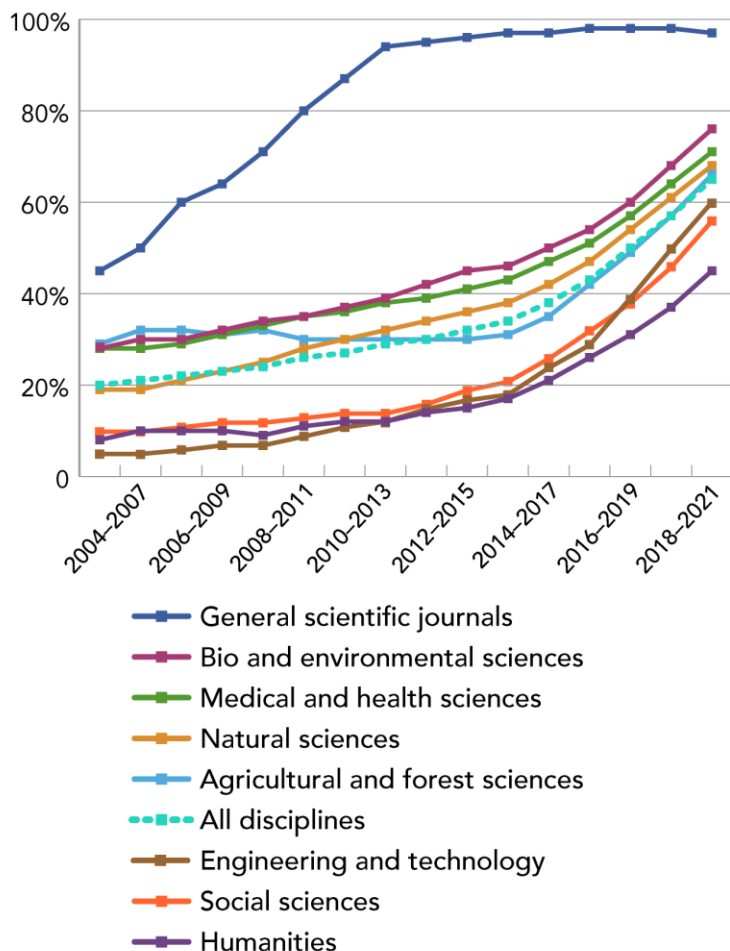


- The top 10 index describes the proportion of the most cited publications; the global average is 1.0. If the index is above 1, the publication is cited more than the global average.
- The citation index for the publications of projects by the RCF has been calculated based on publications by researchers who have worked through Academy Project and Academy Research Fellow funding.

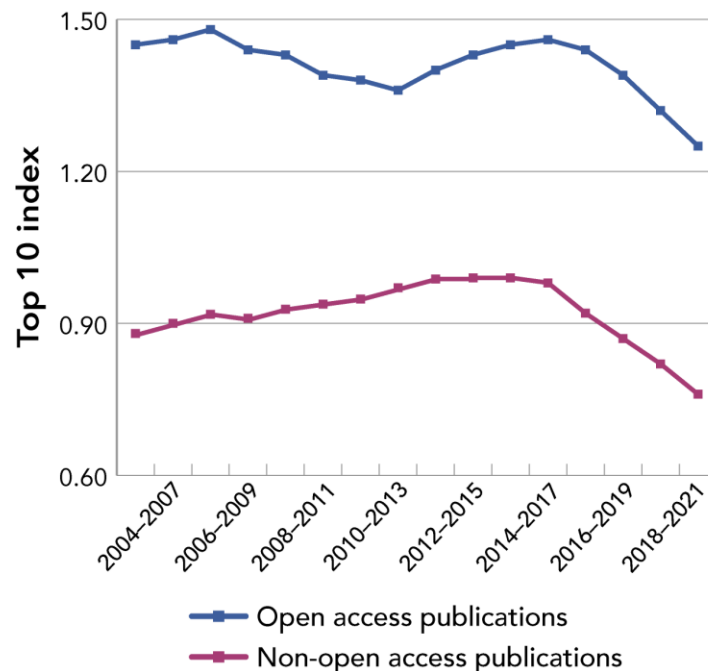
Source: Web of Science based data from Clarivate Analytics, bibliometric calculations CSC - IT Center for Science Ltd, 2017-2023.

Open access publishing in Finland

Share of open access publications by main discipline



Scientific impact of open and non-open access publications



- The figure includes all categories of open access by Web of Science: <https://webofscience.help.clarivate.com/en-us/Content/open-access.html>
- Publications with no information on open access or discipline have not been included.
- The index describes the proportion of the most cited publications; the global average in each discipline is 1.0. If the index is above 1, the publication is cited more than the global average.

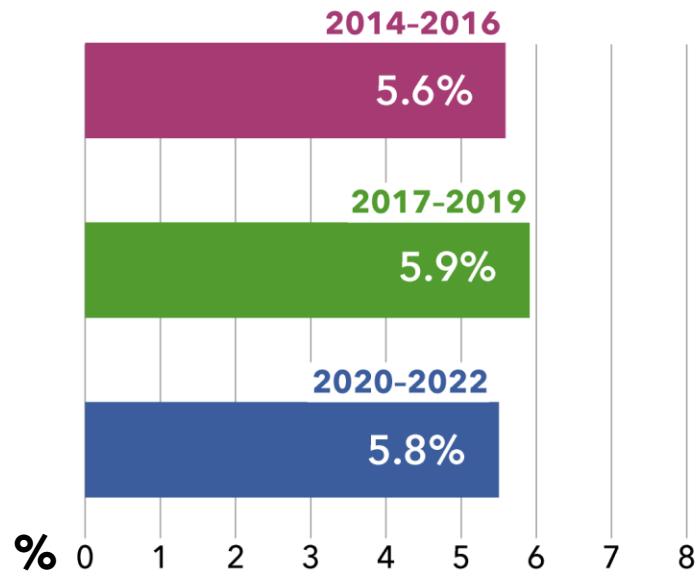
Number of publications by main discipline 2018-2021

Natural sciences	10,123
Bio and environmental sciences	5,104
Engineering and technology	8,447
Medical and health sciences	11,117
Agricultural and forest sciences	1,415
Social sciences	8,688
Humanities	2,334
General scientific journals	1,378
TOTAL	48,606

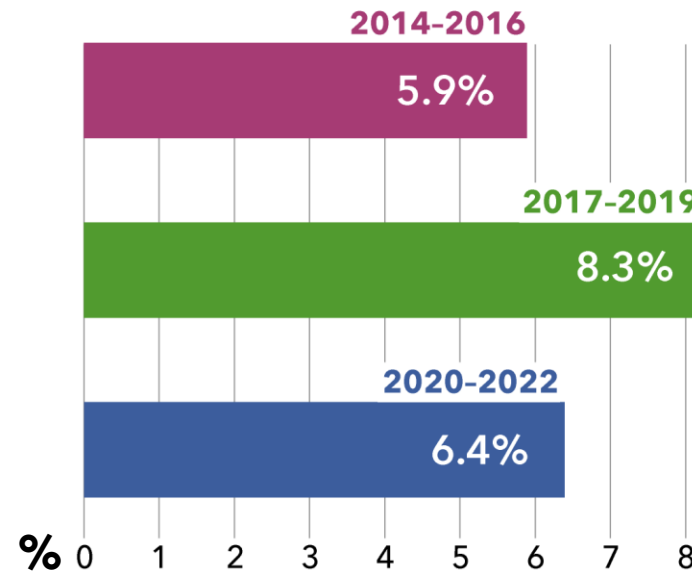
Source: Web of Science based data from Clarivate Analytics, bibliometric calculations CSC - IT Center for Science Ltd, 2024.

Share of corporate co-publications in publications of higher education institutions and government research institutes

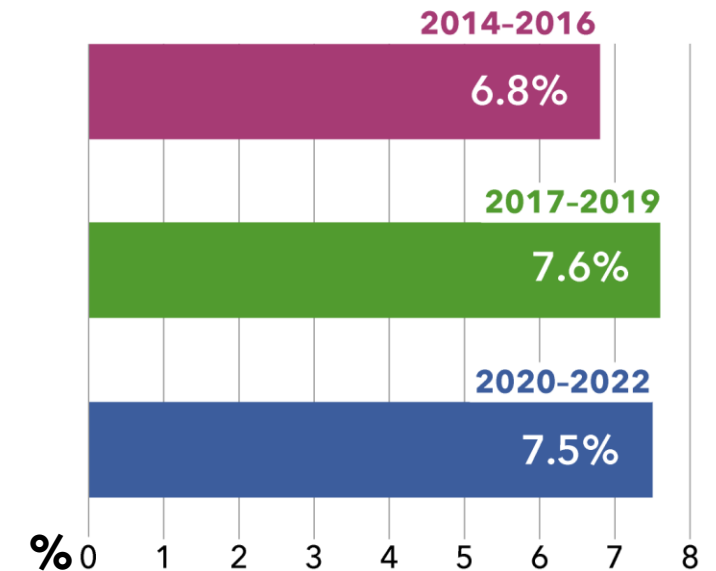
Universities



Universities of applied sciences



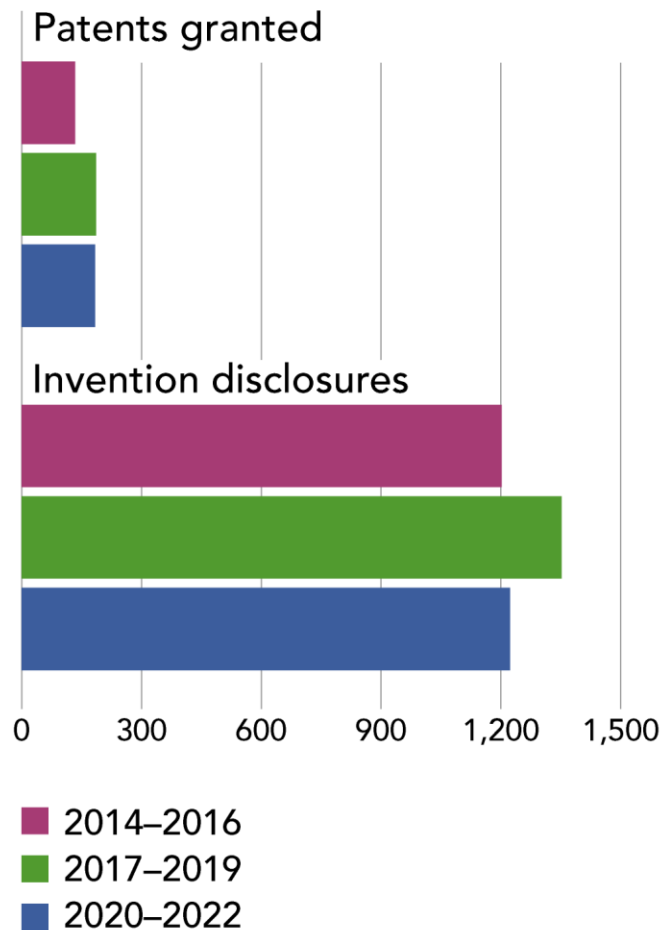
Government research institutes



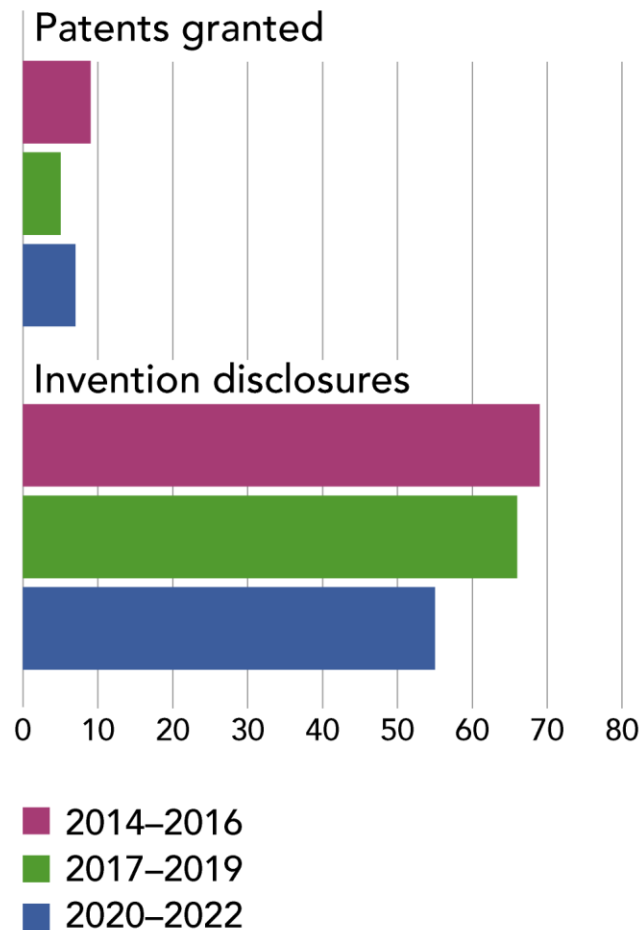
Source: Web of Science based data from Clarivate Analytics, bibliometric calculations CSC – IT Center for Science Ltd, 2024.

Invention disclosures and patents in higher education institutions

Universities



Universities of applied sciences



Publication types H (Patents and invention disclosures) under the classification of categories by the Ministry of Education, Science and Culture are included.

Source: Education Statistics Finland Vipunen, Higher education and R&D, publications.

Background, data and methods



Statistics on the state of scientific research



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 2. Research personnel
 3. Publishing
- Main perspectives
 - International comparison of research funding and publishing activities **by country**
 - **Sectors** (higher education institutions, public sector, companies)
 - **Disciplines**



Production of the statistics on the state of scientific research

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- Bibliometric calculations
 - Yrjö Leino, CSC - IT Center for Science Ltd.
- Layout
 - Sopiva Design



Bibliometric sources

- Results presented here are derived from the Web of Science[®] prepared by CLARIVATE ANALYTICS[®], Inc. (Formerly the IP & Science business of Thomson Reuters[®]), Philadelphia, Pennsylvania, USA: © Copyright CLARIVATE ANALYTICS[®] 2017-2024. All rights reserved. Results are taken with permission from the bibliometric analysis system provided by CSC - IT Center for Science Ltd., Espoo, Finland.



Data sources

- Data for the analyses of scientific publishing are drawn from the Clarivate Analytics Web of Science (WoS) database and the national VIRTATA publication data service (data gathering by the Finnish Ministry of Education and Culture).
- For WoS data, the following publication types are included: article, review, letter, proceedings paper, book chapter and book.
- Citations are calculated using an open citation window from the year of publication until 2023. The most recent publication period for the top 10 index is 2018-2021. The use of an open citation window means that the citation indicator values for publications from earlier publication periods are also updated as new citations are taken into account regarding older publications.





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Methods: discipline of publication

- A publication's discipline is determined based on the subject category used in the Clarivate Analytics' Web of Science database (e.g. a scientific journal or conference publication).
- Many publication channels are classified into several different disciplines.
- Approaches based on disciplinary classifications are poorly suited for examinations of interdisciplinary or phenomenon-based research.





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Methods: Top 10 index

- The index describes the proportion of the top 10% of the most cited scientific publications in the discipline.
- The average for each discipline is 1. An index value greater than 1 means that more than 10% of the publications of a country or organisation rank among the 10% most cited publications in their disciplines.
- When calculating the top 10 index, the number of citations to a publication is only compared to the number of citations to publications from the same discipline and the same year.
- Self-citations are omitted from the calculations.
- Publications are fractionalised between countries and disciplines and, in the case of Finland, between Finnish research organisations.
- The top 10 index is not calculated if the number of publications is under 50 or if internal coverage is less than 40%. Internal coverage refers to the proportion of references in database publications that are also indexed in the database.



Limitations of data and methods used

- Citation indicators such as the top 10 index offer only one perspective on scientific impact, but they do not in themselves provide a true overview of the standard of research.
- Peer reviews are a key mechanism for the evaluation of scientific quality.
- Publications in humanities and many social sciences, in particular, are inadequately represented in international citation databases.
- Publications indexed in these databases alone do not provide an accurate idea of the true extent of publishing in the aforementioned disciplines.





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Definition of concepts 1/5

Research and development (Statistics Finland)

- Research and development (R&D) refers broadly to systematic work aimed at increasing the stock of knowledge and using this knowledge for new applications.
- The aim is to create something essentially new.
- R&D comprises basic research, applied research and experimental development.

R&D expenditure (Statistics Finland)

- R&D expenditure comprises wage and salary spending, costs from purchased services, other current expenditure and investment and acquisition costs.





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Definition of concepts 2/5

Gross domestic product (GDP) (Statistics Finland)

- Gross domestic product (GDP) at market rate is the final result of production by national production units.

R&D intensity

- In these slides, R&D intensity is expressed in terms of national R&D expenditure as a percentage of GDP.
- Indicated as a percentage.





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Definition of concepts 3/5

Public sector and private non-profit agencies (Statistics Finland)

- The public sector comprises central government administrative branches and government research institutes, municipalities (since 2007), social security funds and institutions, as well as private non-profit agencies. Private non-profit agencies are included in the public sector.

Higher education sector (Statistics Finland)

- The higher education sector includes universities, university hospitals, universities of applied sciences and the National Defence University of Finland (since 2016).
- Some public or private research institutes that have close links with university research can also be included in the higher education sector.



Definition of concepts 4/5



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Full-time equivalent (FTE) (Ministry of Education, Science and Culture)

- Regular annual working hours, excluding overtime and other work exceeding normal working hours.
- FTE is not reduced by paid or partly paid sick leave.
- The maximum FTE for a person working full time is 1.

Research FTE (Statistics Finland)

- Calculated full-time R&D work during one year including holidays.

R&D personnel (Statistics Finland)

- Persons who spend at least 10% of their working hours in administrative, office or other support roles directly related to R&D work or R&D projects during the statistical year.



Definition of concepts 5/5



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Research career stage (Ministry of Education, Science and Culture)

- University teaching and research staff are classified with a four-stage research career model in the FTE statistics:

I stage (e.g. doctoral candidate, early-career researcher)

II stage (e.g. postdoctoral researcher)

III stage (e.g. university lecturer)

IV stage (e.g. professor, Academy Professor, research professor, research director)

