Deutsche
Forschungsgemeinschaft

Funding Atlas 2021

Key Indicators for Publicly Funded Research in Germany

Deutsche
Forschungsgemeinschaft

Funding Atlas 2021

Key Indicators
for Publicly Funded Research
in Germany

Deutsche
Forschungsgemeinschaft

Funding Atlas 2021

Key Indicators for Publicly Funded Research in Germany

Deutsche Forschungsgemeinschaft e.V.
German Research Foundation
Kennedyallee 40 · 53175 Bonn, Germany
Phone: +49 228 885-1
Fax: +49 228 885-2777
postmaster@dfg.de
www.dfg.de

Project Management:
Christian Fischer, Dr. Jürgen Güdler

Project Team, Information Management Division of the DFG:
Christian Fischer, Dr. Jürgen Güdler, Dr. Richard Heidler, Alina Porschke, Martin Weigelt

Press and Public Relations Division of the DFG:
Layout, Typography and Cover Design: Tim Wübben
Project Coordination and Editing: Anne Tucholski

We would like to thank the following institutions for their cooperation:
Alexander von Humboldt Foundation
EU Office of the Federal Ministry of Education and Research
Federal Ministry of Education and Research
Federal Statistical Office
German Academic Exchange Service
German Federation of Industrial Research Associations „Otto von Guericke"
Medizinischer Fakultätentag

This report was produced with the kind support of the Stifterverband für die Deutsche Wissenschaft.

STIFTERVERBAND
Bildung. Wissenschaft. Innovation.

The Funding Atlas, along with a large number of Excel spreadsheets including analyses as well as printable graphic files containing illustrations, can be viewed at www.dfg.de/fundingatlas.

Bibliographic information published by the Deutsche Nationalbibliothek
The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available on the Internet at http://dnb.d-nb.de.

ISBN 978-3-96827-004-3

Typesetting: primustype Hurler GmbH, Notzingen
Printing and Binding: mediaprint solutions GmbH, Paderborn

MIX
Papier aus verantwortungsvollen Quellen
FSC® C013205

Printed on FSC®-certified paper.
Printed in the Federal Republic of Germany.

Contents

Tables

Figures

Foreword

This is the ninth edition of the DFG Funding Atlas. Every three years, the largest funding organisation for basic research at higher education institutions and non-university research institutions in Germany, the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation), presents a broad set of key indicators relating to research and development in Germany.

The majority of the analyses are based on data relating to third-party funding acquired competitively from the DFG and other national and international funding sources. The focus is therefore on research institutions in Germany which are actively involved in attracting third-party funding. The main chapter of the DFG Funding Atlas 2021 (chapter 5 – "Subject-Based Funding Profiles of Research Institutions") presents the relevant key indicators in ranking format. From an international perspective, rankings of the most popular destinations of globally respected academics who complete an extended research stay in Germany under the guest programmes offered by the Alexander von Humboldt Foundation (AvH) and the German Academic Exchange Service (DAAD) are especially revealing.

The underlying data allow very fine differentiation by subject as well as in-depth comparisons of research profiles. The DFG Funding Atlas not only looks at individual research institutions but also at the regions in which they are located as well as the cross-regional networks that result from collaboration under selected DFG programmes. In this way it conveys an extremely multi-faceted image of the German research landscape.

The DFG Funding Atlas focuses on longer-term developments. Since the first edition in 1996, which covered the period 1991 to 1995, it has reported certain key indicators on a recurring basis. Each edition also features special analyses.

The founding anniversary of the DFG in 2020 provided an occasion for this edition to take a statistical look at the research map of the years 1921 to 1945, based on more than 50,000 references to DFG proposal submissions dating back to this period. The findings presented in chapter 3 supplement the monitoring of third-party funding and research priorities over the past three decades with a review of the DFG's very eventful early years.

On the one hand, this provides insights into the history of that era. Between the founding phase and the consolidation years of the DFG, the institutions at which research was conducted in Germany underwent rapid change, after which a watershed moment in history arrived with National Socialism and the Second World War. On the other hand, a modern-day perspective allows strands of tradition to be traced, as well as revealing where new regions have since developed a research profile.

Finally, I would especially recommend you to read chapter 3 – "International Aspects of Research Funding". The large number of key indicators relating to international collaboration presented here offer an impressive illustration of how closely networked modern research is nowadays at the global level. As the chapter shows, the ties between German and Russian researchers in particular were diverse and intense during the reporting period.

The start of the Russian war of aggression against Ukraine in February 2022 and the decision on the part of the Alliance of Science Organisations, in agreement with the German government, to discontinue all German-Russian cooperation at the institutional level for the time being means that, even from today's

perspective, a considerable decline is to be expected in German-Russian cooperation and networks, which will therefore have a far-reaching impact on the development of international cooperation as a whole. The next Funding Atlas will document the effect of this "turning point".

I hope this English-language edition of the current DFG Funding Atlas provides a well-founded impression of the subject breadth and regional priorities of the German research system, and I wish you a stimulating read.

Professor Dr. Katja Becker
President of the
Deutsche Forschungsgemeinschaft

1 Introduction

This Funding Atlas 2021 is the ninth edition of the system of key indicators that has been published every three years by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) since 1997. It tracks developments in the allocation of public project-related third-party funding, especially as provided to higher education institutions (HEIs) and non-university institutions, and also contains key figures relating to the funding of individual researchers internationally. The DFG is a member-based institution and regards its Funding Atlas primarily as a service to HEIs with a strong research profile, i.e. the majority of its members, giving them a reporting system that can be used as a tool to support the profile-building process. By publishing this English-language edition, the DFG aims to additionally contribute to highlighting the subject priorities set by the individual HEIs and non-university research institutions in the regions in which they are located so as to raise the visibility of these subject priorities among those who have an interest in Germany as a research base from an international perspective.

The Indicator System Focuses on HEIs and Non-University Research Institutions

Researchers working at universities are the core clientele of the DFG and also the main user group of other public-sector research funding. As such, most of the key indicators reported in the DFG Funding Atlas relate to universities and other HEIs. With regard to non-university research, the key indicators presented in the Funding Atlas focus on the members of the large research associations Fraunhofer-Gesellschaft (FhG), Helmholtz Association (HGF), Leibniz Association (WGL) and Max Planck Society (MPG). Finally, the industry and commerce sector is presented primarily based on key indicators relating to funding provided by the German federal ministries and the EU.

The Funding Atlas – a System of Indicators where the Data is Collected from the Funding Providers rather than from the Funding Recipients

A distinguishing feature of the DFG Funding Atlas is that the key indicators reported in it are based on data collected from the institutions providing the funding, not from those who receive it. As such, it is to be regarded as a service to the research institutions documented in the report, since it relieves them of the burden of having to provide data themselves, as is the case with most other rankings and indicator systems. Its methodology also has the advantage of being based on uniform definitions; what is more, it is free of any errors that may result from differing systems of data management used by the receiving institutions.

The Funding Atlas essentially draws on data that depict the DFG's funding activities. As in previous editions, it was also possible to obtain data from the ministries of the German federal government (in particular the Federal Ministry of Education and Research and the Federal Ministry for Economic Affairs and Energy) and the EU (data on the EU's framework programme Horizon 2020 and the European Research Council (ERC) programme). An important supplement to these data focusing on monetary aspects, is the analysis of funding data provided by the Alexander von Humboldt Foundation (AvH) and the German Academic Exchange Service (DAAD). The visiting researcher programmes offered by these two institutions allow quantifying statements to be made on how outstanding academics from all over the world "vote with their feet" in terms of the institutions and regions they opt to spend time at when undertaking an extended research stay in Germany.

The DFG Funding Atlas is also a Rich Source of Information about International Aspects of Research and its Funding

Research is international: academics usually maintain cooperative relationships across borders. They exchange the outcomes of their research or interim findings at meetings and conferences, interact with colleagues on site in the course of shorter or lengthier stays abroad, and commit their respective knowledge to paper in jointly written articles published in specialist journals.

In a dedicated section of this English-language edition of the DFG Funding Atlas, namely chapter 3, we cluster various key indicators that shed light on the international nature of research. These focus less on the situation in Germany (see chapters 4 and 5) but primarily serve the purpose of international comparison. For example, the statistics presented document how the funds raised in the 25 countries with the largest involvement in Horizon 2020 – the EU framework programme for research and innovation – are distributed among the sectors of HEIs, non-university institutions and industry/commercial enterprises. Cartographic diagrams show how European Research Council (ERC) funding is distributed among destination countries and scientific disciplines, for example. By the same token, information is provided about the countries that guest researchers mainly tend to come from when participating in selected DFG programmes in Germany. A map based on this principle allows a comparison to be made with the countries of origin of international guest researchers taking part in programmes offered by the Alexander von Humboldt Foundation (AvH) and the German Academic Exchange Service (DAAD).

Finally, this Funding Atlas includes a world map showing the countries of origin of researchers with whom DFG funding recipients seek to collaborate based on their project proposal submissions – an impressive demonstration of science's ability to organise itself. These countries are spread all over the globe, ranging from Africa and Central America to Asia and Russia. Russia in particular is identified as an important, longstanding partner in international science cooperation on many of the maps and tables contained here. However, the Russian attack on Ukraine in February 2022 forced the DFG to adapt its international funding activities, too. Together with other major German research institutions, the DFG therefore discontinued all institutional cooperation with its Russian partner organisations with immediate effect – with long-term consequences for future international collaboration and networks that are as yet difficult to assess.

As early as the end of February 2022, the DFG, together with the other members of the Alliance of Science Organisations in Germany, condemned the Russian attack as being in violation of international law and expressed its solidarity with academics in Ukraine, as well as with those in Russia.

Research Institutions and Regions in Germany

Chapter 4 then turns the focus back to Germany. The printed version focuses on key indicators relating to DFG funding and, above all, on universities with a strong research profile. The online supplement offers an extensive collection of map graphics and tables, some of which are interactive, that contain statements allowing comparisons between the "hot spots" of institutions and regions which receive larger amounts of funding from other sources.

Marking the Foundation of the DFG in 1920, a Special Analysis Looks at Funding in the Early Phase (1921–1945)

The DFG Funding Atlas series has been published since 1997, the English-language edition since 2004, so the key indicators cover a relatively long period of time. For the present edition, it was possible to significantly expand the basis for historical comparison by including a special analysis of data covering the early years of DFG funding from 1921 to 1945.

The analysis is based on data relating to some 50,000 proposals that were processed by the DFG within this period. This data can be researched on the (German-language) information system GEPRIS Historisch (www.gepris-historisch.dfg.de), which the DFG released in 2020 to mark the centenary of its founding. For the purpose of the present Funding Atlas, the data from GEPRIS Historisch are used to highlight a topic that has particular appeal in the context of a funding ranking. As the Funding Atlas series has

demonstrated over numerous editions, the higher education landscape has hardly seen dramatic upheavals in terms of the key indicators described. Research institutions usually establish largely stable subject-specific structures over years (if not decades). And they draw on these structures to acquire third-party funding or attract foreign guest researchers, usually at a fairly constant level. But what picture emerges if we take a look much further back in the past? Does involvement in DFG funding from 1921 to 1945 show similarities to the situation today? Have powerful new research bases become established, or are centres that were very active at the time now less visible by comparison?

Wide Range of Rankings in the Main Chapter of the DFG Funding Atlas and in the Online Supplement

The centrepiece of the Funding Atlas, chapter 5, is devoted to the question of the subject priorities of the research institutions included in the reporting system. The printed version of the Funding Atlas presents findings in the familiar structure according to the four scientific disciplines on which the DFG subject classification system is based. In these chapters, the subject-specific view is then further enhanced, either according to the 14 DFG research areas, or else based on the funding areas as applied by the German federal government and the EU. While the print version concentrates on the 20 to 40 highest-ranked HEIs, the extensive online supplement to the DFG Funding Atlas also offers overviews of the subject priorities of smaller HEIs and non-university research institutions – further differentiated by subject according to a total of 48 research fields based on the DFG figures. The printed version continues to offer the cartographic network analyses familiar from previous editions, showing how HEIs and non-university research institutions cooperate within and beyond regions in each scientific discipline under coordinated DFG-funded programmes.

The Funding Atlas is Supported by the Stifterverband

Since the third edition, the DFG Funding Atlas has been supported by the Stifterverband für die deutsche Wissenschaft (“Donors’ association for the promotion of humanities and sciences in Germany”). It is this support, as well as the DFG’s close ongoing operation with various funding institutions, that enables the reporting spectrum of the Funding Atlas to be advanced on a continuous basis.

2 Publicly Funded Research in Germany – an Overview

The following is a presentation of overarching statistics on research and development in Germany. The overview begins with an international comparison of expenditure on research and development and then goes into detail on questions of resource allocation in Germany, in particular the importance of third-party funding. The chapter concludes with an overview of the sources of public funding included in the DFG Funding Atlas.

2.1 Expenditure on Research and Development in Germany

Research and development (R&D) are considered engines of growth in most countries around the world. Their importance for tackling climate change can hardly be overestimated, while the coronavirus pandemic in particular has shown the outstanding importance of successful research for society. Research is essential and deserves trust – something that now also meets with broad consensus among the public at large: even in pre-pandemic times the majority of the population expressed trust in science and especially in research – either just above or just below half of those surveyed, depending on the year – but these figures increased significantly in 2020 according to the findings of the Science Barometer conducted annually in Germany by *Wissenschaft im Dialog*[1]. As such, the decision to invest significant portions of publicly available funds in research and development is based on a fairly solid foundation: investment in research is seen by the public as money well spent, too.

At the European level, this idea became established early on. As early as 2000, the European heads of state and government adopted the so-called Lisbon Strategy with the goal of making Europe "the most competitive and dynamic knowledge-based economy in the world" – expressed in the target agreement of the EU member states to invest 3% of gross domestic product (GDP) in these areas in the medium term.[2] This goal was renewed in 2010 under the title "Europe 2020 Strategy".

Since the target was adopted in 2000, this figure has increased from 2.40 to 3.07% (GWK, 2020b: 12). As of July 2022, the provisional figure for 2020 is already 3.14% (BMBF, 2022: 51).

The 3% Target – an International Comparison

Figure 2-1 shows R&D expenditure in 2018 and its share of gross domestic product (GDP) for selected countries in Europe and worldwide.[3] The countries leading the way on this basis – as already stated in the last edition of the DFG Funding Atlas (DFG, 2019: 14) – are the USA, China and Japan. Germany ranks fourth in terms of absolute expenditure.

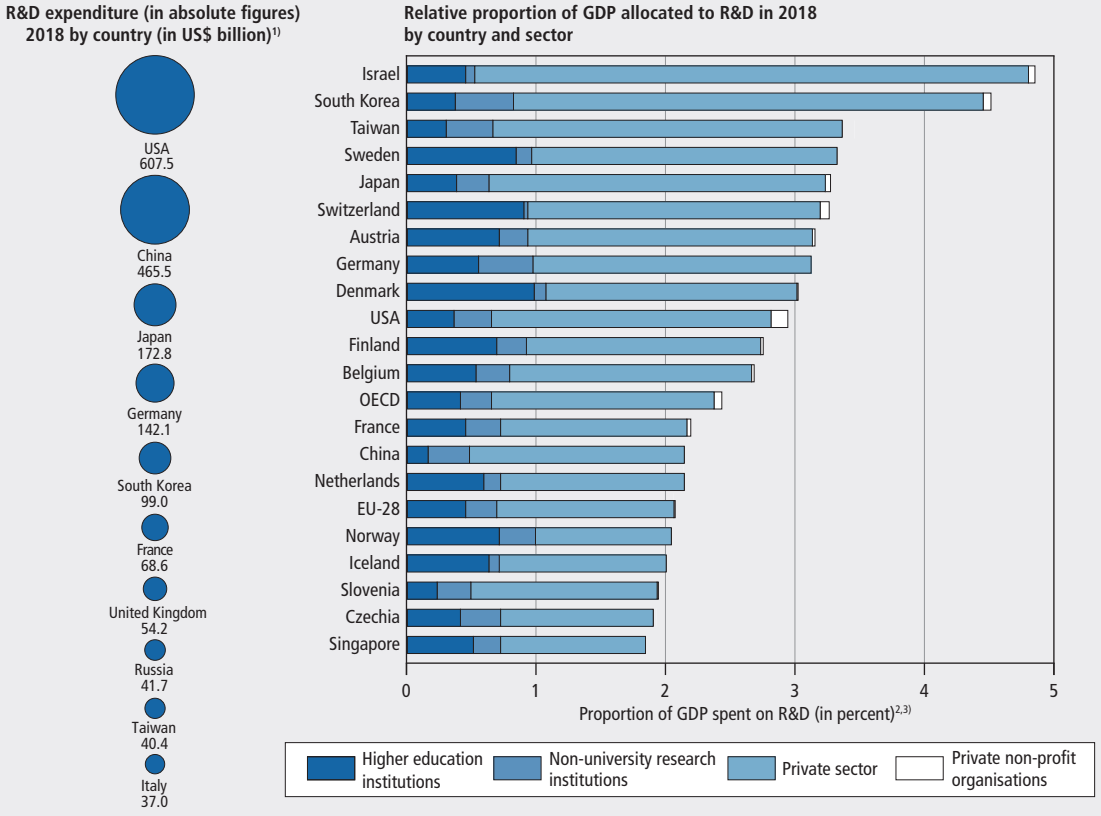
As the economically strongest country in the European Union – measured by GDP – Germany has the highest R&D expenditure in nominal terms for 2018, at US$142.1 billion purchasing power parities. As such, Germany accounts for a good third of the total R&D expenditure of the EU-28 countries, amounting to a total of US$413.0 billion (OECD, 2020). It is followed by France with US$68.6 billion and the UK with US$54.2 billion, these three countries therefore accounting for about 64% of R&D expenditure in the European Union.

1 www.wissenschaft-im-dialog.de/en/our-projects/science-barometer

2 The Joint Science Conference (GWK) publishes an annual report containing details of the measures taken by the German federal government and federal states to achieve this target (GWK, 2020b).

3 For comparison purposes, the budgets are uniformly converted into US$ purchasing power parities according to the OECD source. See also the Glossary of Methodological Terms under "OECD statistics" at www.dfg.de/fundingatlas.

Figure 2-1:
Expenditure on R&D in Germany and abroad in 2018



[1] Nominal expenditure, converted to US$ purchasing power parities.
[2] Includes provisional data and OECD estimates.
[3] This reporting sample is restricted to countries whose expenditure on R&D was equivalent to or greater than 1.8 percent of their GDP in 2018.

Note: Corresponds to Abbildung 2-1 of the DFG Förderatlas 2021.

Data basis and source:
Organisation for Economic Co-operation and Development (OECD): Main Science and Technology Indicators 2021/6.
Calculations by the DFG.

In addition to the comparison of absolute totals, the right-hand section of Figure 2-1 also shows the relative shares of R&D expenditure in GDP, including the OECD countries that reached at least the 1.8% threshold in 2018. This chart also shows how the relevant share per country is distributed across sectors. Looking first at the European countries, Sweden, Switzerland (as a non-EU country), Austria, Germany and Denmark have already exceeded the 3% target, so they lead the ranking. However, the majority of the EU-28 countries are at an overall average of a good 2% – still a long way from the figure set for last year. If we take a broader view and include the leading OECD countries, we find that the OECD average of 2.4% for 35 countries is 0.4 percentage points higher than the EU-28 average. So globally speaking, the EU is still lagging behind the OECD countries as a whole.

Significant Differences in Sectoral R&D Participation by Country

Looking at the relative share of R&D expenditure in gross domestic product by sector in the individual countries in 2018, there are certain structural differences to be noted. The share of HEIs in R&D expenditure is particularly significant in Denmark, Switzerland and Sweden, at more than 0.8%. In Germany, the share of HEIs is around 0.6%, which is also above the average of EU states. But with a share of around 2.2%, the business sector has a much stronger presence in Germany than in other countries. Only the EU countries Sweden and Austria have higher shares of R&D expenditure in the business enterprise sector. Outside the EU, Israel, South Korea, Taiwan and Japan are the countries where business is a key driver of the R&D sector. In addition to HEIs and industry, Germany has a non-uni-

versity research sector that impacts heavily on the R&D sector with the publicly funded research organisations Fraunhofer-Gesellschaft, Helmholtz Association, Leibniz Association and Max Planck Society. With a share of 0.4%, this sector is slightly less significant in the area of R&D expenditure than the HEIs. Evidence of a comparable share of non-university research institutions is otherwise only to be found in South Korea and Taiwan.

2.2 Third-Party Funded Research at HEIs and Non-University Research Institutions

Research and teaching at HEIs are predominantly financed from so-called basic funding. Universities in particular also have a share of administrative income that actually exceeds basic funding – but only if they operate a hospital that is responsible for generating the bulk of income as classified here. In this case, the funds also primarily go towards the ongoing maintenance and expansion of the relevant healthcare infrastructure. Finally, a third source of income which primarily benefits research at HEIs is third-party funding. As a rule, these funds are generally acquired through competition-based procedures by researchers at the respective institution so as to finance projects that mainly run for a limited period of time.

Third-Party Funding Rate of HEIs Stable Since 2013

In order to be able to compare the level of third-party funding between one institution and the next, as well as between different types of HEI, the so-called third-party funding rate is calculated as a share of the sum of current basic funding and the third-party funding acquired. Administrative income is therefore excluded because it would lead to distortions, especially in the case of universities with an affiliated hospital.

As can be seen in Figure 2-2, the third-party funding rate remained largely stable during the reporting period. The highest figure is documented for the year 2013 (28.1%), in the current reporting year it is 26.9%. In addition to the stable rate, note that both basic funding and third-party funding have increased over time: German HEIs have an increasing budget available to them as the years progress.

Most recently, external funding increased by 4.3% and basic funding increased by 5.3% in 2019. In total, higher education institutions received ongoing basic funding of just under €24 billion in 2019. This compares with third-party funding income of €8.7 billion.

DFG is the Largest Provider of Third-Party Funding to HEIs

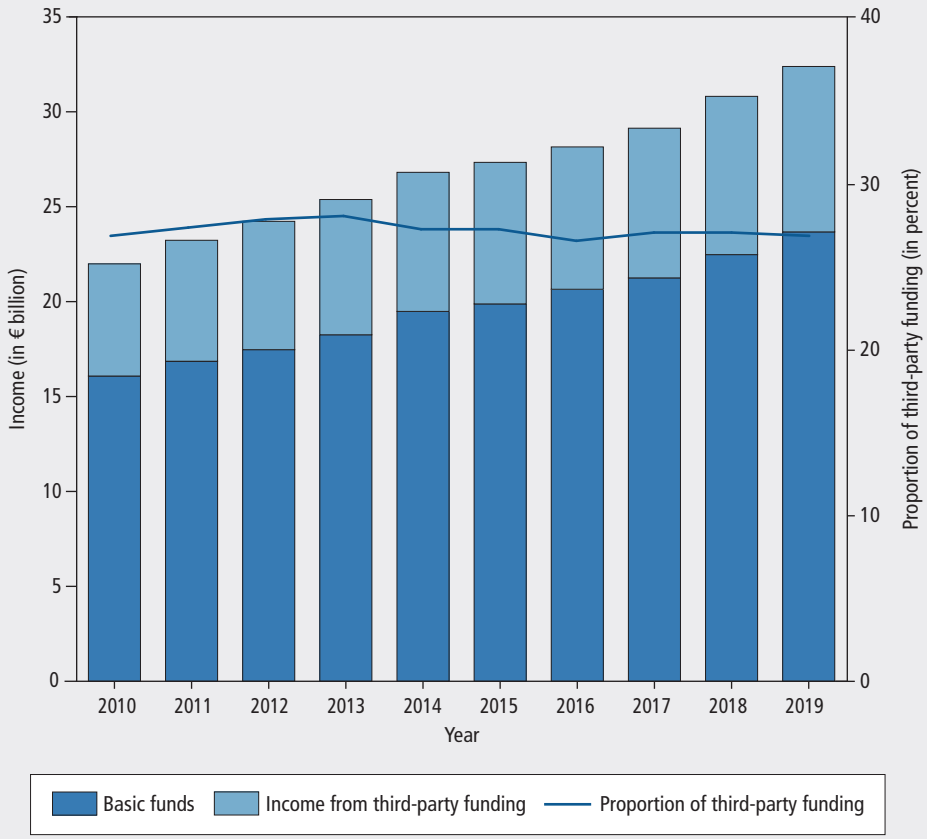
If we look at the funding providers' shares of third-party funding income (see figure 2-3), it is noticeable that the DFG's share of HEI third-party funding income has remained stable over time at around one third. The DFG had the highest share in 2010 at 34.1 percent; in 2019 its share was 31.5%. So this figure in fact seems to have declined somewhat, even though the DFG budget saw strong growth over the same period: in 2010 the DFG was able to provide €2 billion for research at HEIs, and this figure reached €2.7 billion by 2019.

As such, the DFG is still the largest provider of third-party funding for HEIs, although it is closely followed by the federal government, which after a significant increase in its share over the last ten years reached a level of 29% in the current reporting year – up from 22% in 2010.

Relative and Absolute Decline in Third-Party Funding Income from Industry and Commerce

By contrast, the share of third-party funding provided by industry and commerce has steadily decreased over time. While the share was still at 21% in 2010, a figure of just 17% is documented for the current reporting year 2019. Third-party funding from the business sector thus shows the smallest increase over the last ten years. While third-party funding from the federal government increased by more than 90% from 2010 to 2019, third-party income from industry and commerce rose by only 21% over the same period. An overview of the third-party funding income of individual HEIs is provided in Table Web-1 in the Funding Atlas online supplement at www.dfg.de/fundingatlas.

Figure 2-2:
Trend in basic and third-party funding of higher education institutions 2010 to 2019



Note: Corresponds to Abbildung 2-3 of the DFG Förderatlas 2021.

Data basis and source:
Federal Statistical Office (Destatis): Education and Culture. Finances of Higher Education Institutions 2019. Subject-Matter Series 11, Series 4.5. Calculations by the DFG.

Widely Differing Third-Party Funding Sources Among Non-University Institutions

At non-university research institutions, too, a significant proportion of funding comes from third-party sources. For the four major science organisations, the Fraunhofer-Gesellschaft (FhG), the Helmholtz Association (HGF), the Leibniz Association (WGL) and the Max Planck Society (MPG), this can be shown based on data collected for reporting by the Joint Science Conference (GWK). For the institutions of the Fraunhofer-Gesellschaft in particular, third-party funding is not a source of income that supplements basic funding but itself constitutes the financial foundation: around 66% of the FhG's income is third-party funding (see Table Web-36 at www.dfg.de/fundingatlas). The institutes of the Fraunhofer-Gesellschaft cooperate closely with business partners, whether large corporations or small and medium-sized enterprises (SMEs). These partners are frequently based in the region in which a Fraunhofer Institute is located. The third-party funding rates of the Helmholtz Association (around 28%) and the Leibniz Association (just under 28%) are also slightly above those of the HEIs. A comparatively moderate third-party funding rate of 11% is documented for the Max Planck Society (see Table Web-36 at www.dfg.de/fundingatlas).[4]

Figure 2-4 provides a comparison of the most important sources of third-party funding for non-university research institutions. In the current reporting year, the FhG and HGF each had a 38% share of third-party

4 For more detailed information on the funding structure of non-university research, see the PFI report series (GWK, 2020a: 41).

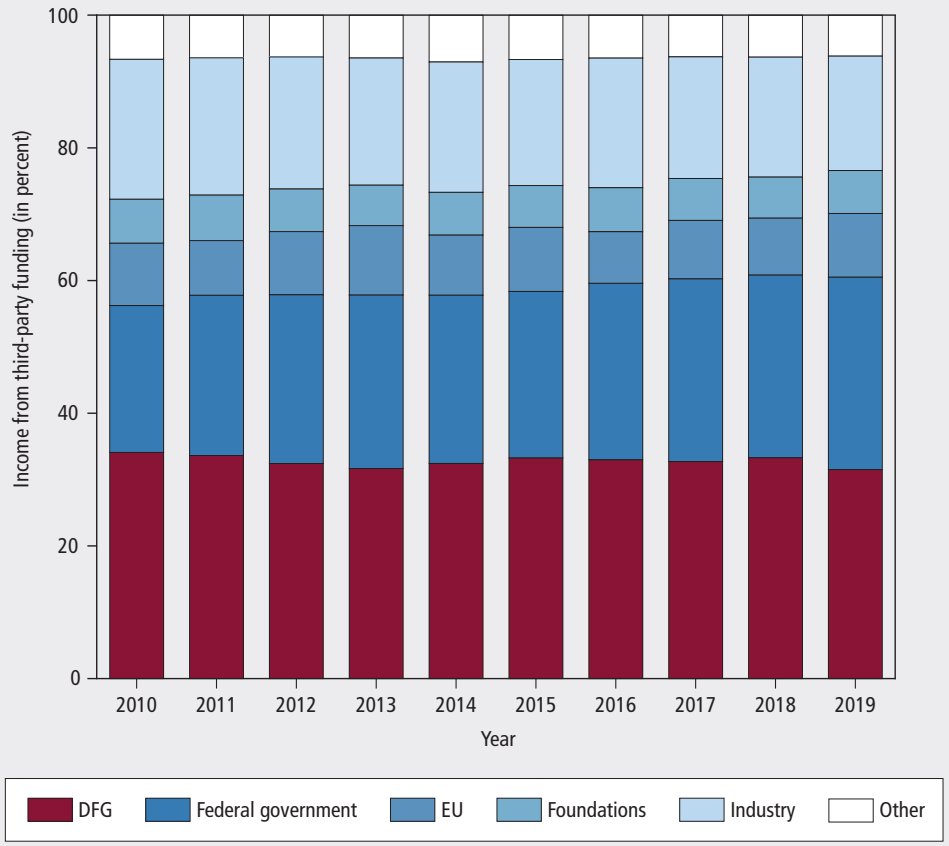
funding from the federal government, while the WGL's share was slightly higher (39%) and the MPG's was significantly lower (25%). As shown above, the share of third-party funding from industry is particularly high for the FhG (also 38%), while the other three organisations range between 5% and 11%. Finally, it is important to emphasise the considerable differences in terms of DFG third-party funding here, too: while virtually negligible for the FhG, it accounts for some 5% for the HGF, 19% for the WGL and 29% for the MPG. Tables Web-19, Web-24 and Web-28 in the DFG Funding Atlas online supplement provide information on the extent to which the individual institutes of the FhG, HGF, WGL and MPG receive third-party funding from the DFG, the federal government and the EU.

2.3 Funding Bodies and Programmes Included in the Funding Atlas

The chapters that follow present the key indicators that constitute the principal focus of the DFG Funding Atlas. These mainly draw on the data available on third-party funding, but also include headcount figures for stays by visiting researchers who were funded by the Alexander von Humboldt Foundation (AvH) and the German Academic Exchange Service (DAAD), for example.

With its key indicators, the DFG Funding Atlas covers the bulk of third-party funding provided by the public sector in Germany. The main focus of the analysis is on the HEIs that acquire these funds, along with the institutions of the major research organisations (FhG, HGF, WGL, MPG). In addition, key fig-

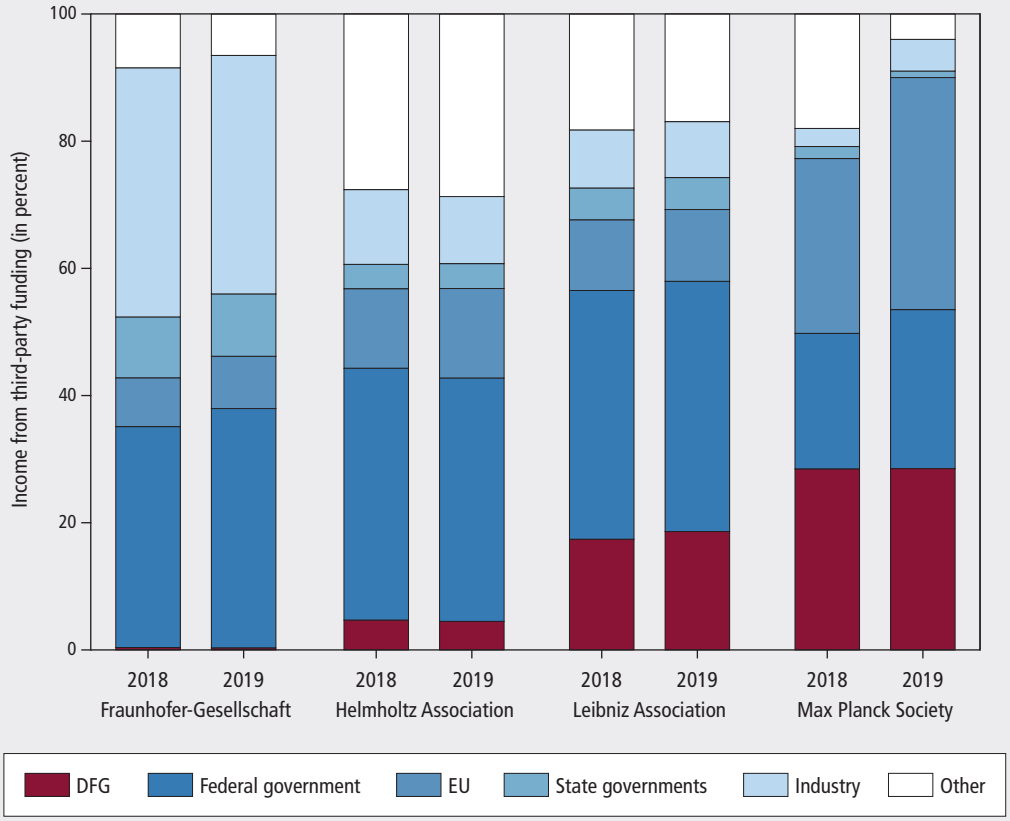
Figure 2-3:
Trend in higher education institutions' income from third-party funding 2010 to 2019 by funding source



Note: Corresponds to Abbildung 2-4 of the DFG Förderatlas 2021.

Data basis and source:
Federal Statistical Office (Destatis): Education and Culture. Finances of Higher Education Institutions 2019. Subject-Matter Series 11, Series 4.5. Calculations by the DFG.

Figure 2-4:
Third-party funding income of non-university research institutions in 2018 and 2019 by funding source



Note: Corresponds to Abbildung 2-5 of the DFG Förderatlas 2021.

Data basis and source:
Joint Science Conference (GWK): Joint Initiative for Research and Innovation. Monitoring Report 2020.
Calculations by the DFG.

ures are presented relating to the acquisition of public funding by specific regions, which in the case of the federal government and the EU also include business R&D funding.

The main data source for the DFG Funding Atlas is the DFG's own funding database: in addition to the analyses undertaken for this publication, this provides the basis for a very extensive range of services offered by the DFG (see an overview in Figure 2-5 and www.dfg.de/en/dfg_profile/facts_figures/).

In particular, the main tool for linking the data provided by other funding providers and relating it to the individual HEIs and non-university research institutions according to uniform criteria is the DFG's Institution Database, which the GERiT information system, and also the identifiers used there for HEIs and non-university research institutions are based on.[5]

The following sections describe which funding providers and instruments are covered in the DFG Funding Atlas and what their specific orientation is.

2.3.1 Deutsche Forschungsgemeinschaft (DFG, German Research Foundation)

The German Research Foundation is the main funding organisation for research in Germany.

5 Identifiers are an important tool for linking data of differing provenance. The GERiT website provides a file containing the DFG identifier and other internationally recognised keys (Wikidata, ROR) for more than 2,000 German HEIs and non-university research institutions (www.gerit.org/en/service).

Its core task is to support knowledge-driven research projects conducted by researchers at HEIs and non-university research institutions. As a self-governing organisation, "[the German Research Foundation] serves the sciences and humanities and promotes research in all its forms and disciplines." (DFG, 2021: Preamble). In organisational terms, the DFG is an association under private law. Its member organisations include most German HEIs, non-university research institutions, science organisations and academies of sciences and humanities. The DFG is funded by the federal and state governments, which are represented on all of its decision-making bodies, though the latter are nonetheless mainly composed of academic representatives. As a research funding provider, the DFG supports all scientific disciplines with an annual budget which most recently amounted to approximately €3.3 billion (DFG, 2020a: 191). One important characteristic of DFG funding is that research projects are supported in 'response mode'. DFG funding does not concentrate on thematically focused programme lines, so all of the DFG's decisions are based solely on scientific quality criteria. Scientific quality is evaluated in a multi-stage process, the initial stage of which is based on appraisal by expert volunteer reviewers (peer review). Every year, the expertise of some 15,000 reviewers provides an essential foundation for the decision-making processes conducted by the statutory bodies of the DFG.[6] In the second stage, the members of the review boards – elected every four years by the various scientific communities (most recently in 2019) – take responsibility for the quality assurance and evaluation of the reviews and the review process as a whole, as well as preparing the final decision by the DFG's statutory bodies.

DFG Funding Instruments

The funding instruments used to calculate the figures reported in the Funding Atlas cover approximately 98% of the DFG's funding volume. The instruments under consideration are shown with their respective shares in Table 2-1. The funding instruments mentioned here for information only, including science prizes, the funding of international academic contacts, and committees and commissions, are not considered in any more detail. Individual Grants are the traditional instrument of DFG funding. Most funding goes into research grants which can be used by researchers at any time to work individually or in small groups on research projects on a bottom-up basis and without specified requirements, usually limited to a period of three years.

In DFG funding there is an important emphasis on Coordinated Programmes, i.e. instruments that support collaboration between researchers in various forms. Exactly 43% of the DFG budget goes into Research Centres, Research Units and Collaborative Research Centres, which first and foremost provide a framework for regionally concentrated projects; Research Training Groups, which are designed to support the collaborative training of early-career investigators; and Priority Programmes, in which researchers throughout Germany work together on a shared research question. The funding lines of the Excellence Initiative and the Excellence Strategy likewise emphasise the element of collaboration between the outstanding research hubs in a region, usually across multiple disciplinary boundaries.

The share of the Coordinated Programmes has remained very constant throughout the three editions of the Funding Atlas. Individual Grants have gained ground, their share increasing from 31.5% to 35.1%, also reflecting an increase from the relevant figure of 33.7% as recorded in the DFG Funding Atlas 2015 (DFG, 2016: 21). In absolute terms, the volume of funds made available for Individual Grants increased by €725 million compared to the prior period, while the total volume for all DFG programmes increased from €8.4 billion to €9.7 billion.

Excellence Initiative and Excellence Strategy of the Federal Government and Federal States

The Excellence Initiative of the federal and state governments, implemented in two phases from 2005 onwards, aimed to promote top-level research while at the same time raising the quality of Germany as a location for higher education and science across the board. The funding providers made a total of around €4.6 billion available in the period 2005 to 2017. Implementation of the Excel-

6 A detailed statistical analysis of the DFG's review system is provided by a (German-language) study published in 2018 (DFG, 2018b).

Table 2-1:
DFG funding instruments: awards for the years 2017 to 2019

Funding instrument	Awards[1]	
	€m	%
Individual Grants	**3,382.8**	**35.1**
Research Grants[2]	2,969.6	30.8
Emmy Noether Programme	258.7	2.7
Heisenberg Programme	76.8	0.8
Reinhart Koselleck Projects	33.7	0.3
Clinical Trials	44.1	0.5
Coordinated Programmes	**4,148.6**	**43.0**
Research Centres	74.0	0.8
Collaborative Research Centres[3]	2,273.4	23.6
Priority Programmes	670.6	6.9
Research Units[4]	488.2	5.1
Research Training Groups	642.4	6.7
Excellence Initiative/Strategy of the German federal and state governments	**1,376.9**	**14.3**
Graduate Schools (Excellence Initiative)	176.7	1.8
Clusters of Excellence (Excellence Initiative)[5]	563.3	5.8
Clusters of Excellence (Excellence Strategy)	173.7	1.8
University allowances (Excellence Strategy)	30.7	0.3
Institutional strategies (Excellence Initiative)	432.5	4.5
Infrastructure Funding[6]	**575.3**	**6.0**
Major Research Instrumentation[7]	403.6	4.2
Scientific Library Services and Information Systems	171.7	1.8
Total	**9,483.7**	**98.3**
Programmes not covered by the Funding Atlas	**167.3**	**1.7**
Prizes, other forms of funding[8]	167.3	1.7
Overall	**9,651.0**	**100.0**

[1] Including programme allowance for indirect project costs, not including non-institutional funding recipients and funding recipients abroad.
[2] Including publication grants, return grants, core facilities, workshops for early career investigators, project academies and scientific networks.
[3] Including the variation of CRC/Transregios.
[4] Including the variation of Clinical Research Units.
[5] Consortia emerging from the Excellence Initiative without follow-up funding as new Clusters of Excellence under the Excellence Strategy received completion funding from November 2017.
[6] Not including central research facilities.
[7] Including Scientific Instrumentation – Information Technology equipment initiative and major research instrumentation according to Art. 91b of the Basic Law (GG). DFG awards including applications for additional costs for procurement. Excluding state government funding.
[8] Including non-institutional funding recipients and funding recipients abroad.

Note: Corresponds to Tabelle 2-3 of the DFG Förderatlas 2021.

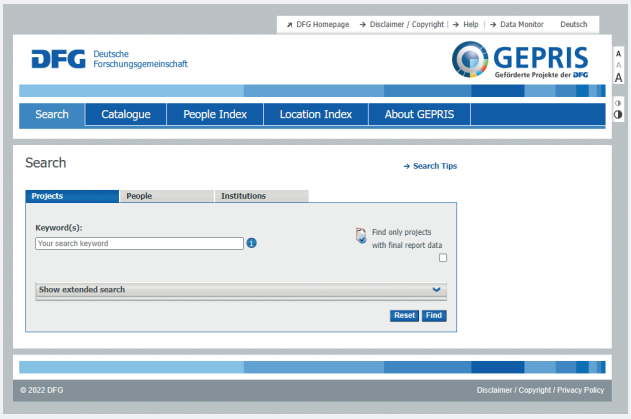
Data basis and source:
Deutsche Forschungsgemeinschaft (DFG, German Research Foundation): DFG awards for 2017 to 2019.
Calculations by the DFG.

lence Initiative was the joint responsibility of the DFG and the German Council of Science and Humanities, which serves as the most important advisory body to the federal and state governments on science policy issues in Germany. In the second phase of the Excellence Initiative from 2012 to 2017 (which falls within the reporting period covered by this Funding Atlas), funding was provided for 45 Graduate Schools, 43 Clusters of Excellence and eleven Institutional Strategies.

The Excellence Strategy (ExStra) was adopted in 2016 as the successor to the Excellence Initiative, based on an administrative agreement between the German federal government and the federal states (GWK, 2016). One key innovative feature of the Excellence Strategy is that it has no defined end point.

Figure 2-5:
DFG information services on research funding

GEPRIS – information system for DFG-funded projects



The GEPRIS information system is an online database from the DFG that provides information about current and completed research projects. The database at gepris.dfg.de features more than 130,000 DFG-funded projects carried out by almost 85,000 researchers. The key project aims are described by the applicants in an abstract. The information is supplemented by selected publication titles from the final project reports submitted to the DFG.

There is an English user guide to help international users search the database.

▶ **gepris.dfg.de/en**

GERiT – German Research Institutions

The information portal GERiT – German Research Institutions – provides an overview of approximately 30,000 institutes at German universities and non-university research institutions organised by subject area as well as by geographical and structural criteria. GERiT allows users to search for institutes in a particular field with the aid of a very finely structured classification system. The classification system developed by the Federal Statistical Office (Destatis) identifies more than 650 different subject areas. The main page for each institute listed in GERiT then provides access to more detailed information. For many universities GERiT also provides a link to the institution's own careers portal. In collaboration with the German Rectors' Conference (HRK), GERiT also indicates whether an institute offers doctoral programmes. If so, a link is provided to the university's doctoral regulations.

GERiT is primarily designed to enable students, researchers and multipliers from Germany and other countries to find German research institutions in the particular areas they are interested in.

▶ **www.gerit.org/en**

DFG annual report

As well as providing a general overview of research funding, the DFG's annual report presents extensive statistical information. The chapter "Funding activities – facts and figures" explores the distribution of DFG funding by subject area, the scope of funding within individual programmes, the participation of women in the proposal process, and trends in proposal success rates. The annual report therefore complements the regularly updated statistics, analyses and evaluation studies available at www.dfg.de/en/dfg_profile/.

▶ **www.dfg.de/annual_report**

Note: Corresponds to Abbildung 2-6 of the DFG Förderatlas 2021.

For the first ten years, €533 million per year are available to promote cutting-edge research at universities.

The funding line Clusters of Excellence (start of funding: January 2019) will continue to be implemented by the DFG. One new programme element is the so-called university allowance. This can be used to apply for a supplement of up to €1 million per cluster per year to strengthen university governance and strategic orientation. Since January 2019, a total of 57 Clusters of Excellence have received funding. The Graduate Schools funding line has been discontinued. Development and implementation of the Institutional Strategies funding line will continue to be the responsibility of the German Council of Science and Humanities under the title Universities of Excellence. While the Institutional Strategies funding line continued to received its funding amounts through the DFG, the awards for the ten Universities of Excellence and one Alliance of Excellence (in Berlin) being funded since November 2019 (and therefore largely outside the 2017 to 2019 reporting period under consideration here) are no longer included in the DFG Funding Atlas figures.

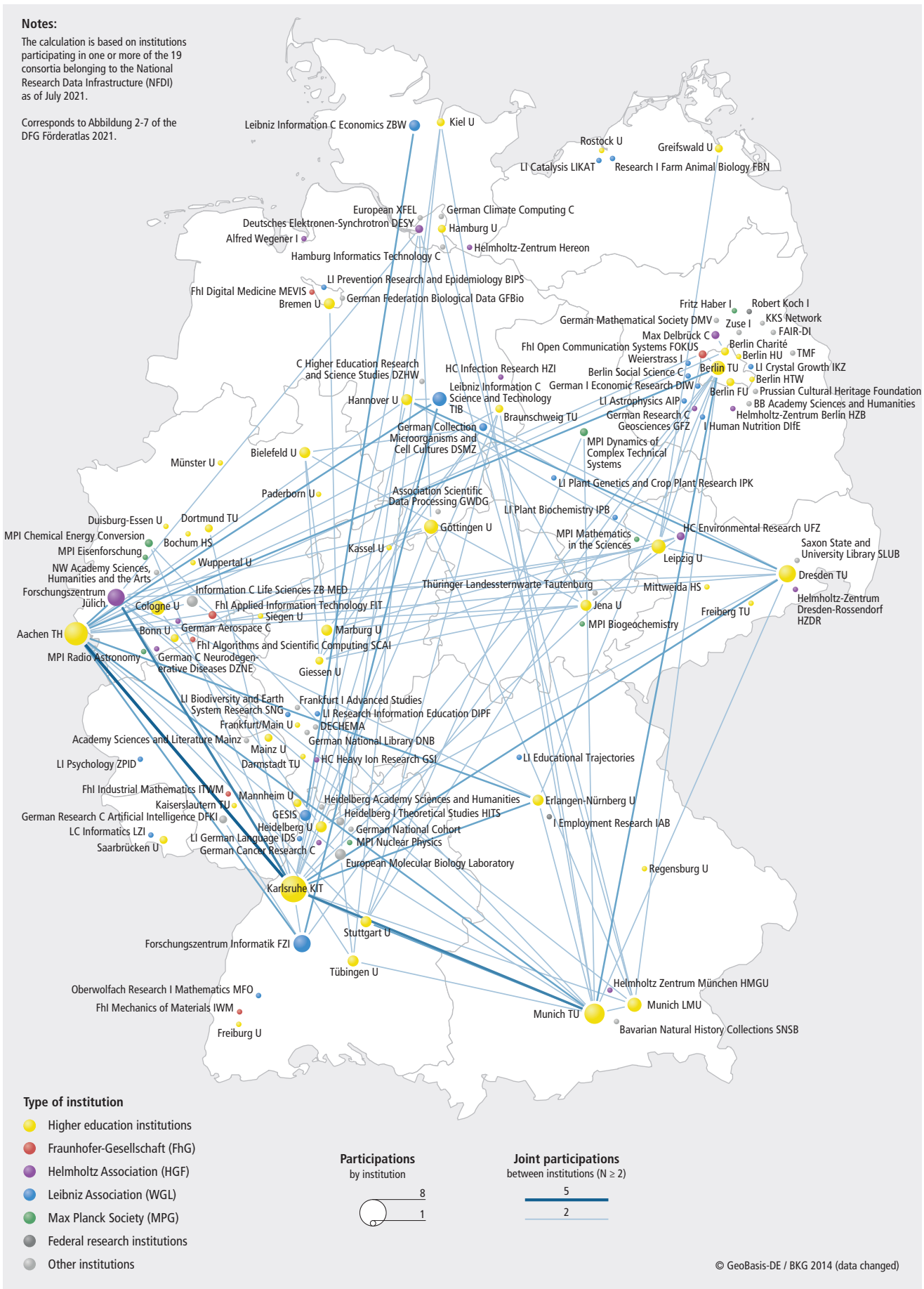
A New Funding Priority – the National Research Data Infrastructure (NFDI)

The National Research Data Infrastructure (NFDI) constitutes a major step forward in the development of digital sustainability in German science: in November 2018, the Joint Science Conference of the federal government and federal states (GWK) agreed to provide funding of up to €90 million per year for ten years for the NFDI. The use of digital technologies is resulting in ever-larger databases in research and science, too: the aim of the NFDI is to ensure their systematic accessibility and sustainability so that as many researchers as possible, from both Germany and all over the world, can enjoy access to these rich resources. For this purpose, researchers join together with the infrastructure facilities relevant to them to form consortia in which they organise themselves by subject or methodology, discuss which data and services they actually need in their disciplines and determine how they can also ensure long-term use of the data by third parties. A total of up to 30 consortia are to be funded. The 22 NFDI consortia initiatives that started with a proposal in 2019 already cover the entire range of all scientific disciplines. Nine of these consortia received a funding approval in June 2020, while in July 2021 a further ten consortia were accepted for federal and state funding based on 17 proposals.[7]

The idea of networking is fundamental to the development of the NFDI, giving rise to intense, cross-institutional collaboration both within and between the individual consortia. In the context of the DFG Funding Atlas, it is interesting to identify the institutions that engage with each other as particularly active nodes within the cross-institutional cooperation networks as part of the NFDI. Figure 2-6 shows the links between the participating institutions in Germany formed by the 19 consortia that currently receive funding. The size of the circles symbolises the number of participations per institution in the NFDI consortia, while the lines indicate joint participations. Since there are almost 1,500 of these joint participations in the NDFI as a whole, a line is only included here where there are two or more joint participations. Almost 130 institutions make up the NFDI network, all of which are listed in Figure 2-6. Of these, some 50 institutions are involved in more than one consortium. This figure clearly shows that technical universities are involved in the NFDI in particular, as well as a large number of non-university institutions, namely the Helmholtz and Leibniz Associations. Key nodes with a large number of participations in consortia are **KIT Karlsruhe**, **TH Aachen**, **TU Munich** and **TU Dresden**. Among the non-university institutions, **Forschungszentrum Jülich** and **FIZ Karlsruhe – Leibniz Institute for Information Infrastructure** are particularly important NFDI hubs. As a programme with a particular focus on digital information infrastructure, the NFDI target group differs somewhat from that otherwise represented in the Funding Atlas: examples here include **FIZ Karlsruhe**, as just mentioned, as well as various libraries and six Fraunhofer Institutes. Regionally, the Berlin area in particular stands out with a large number of participating institutions, as well as the Rhineland and the Rhine-Neckar area including the extension towards Karlsruhe, where the above-mentioned actors are based. Since the funding decisions on the NFDI consortia reported here were not made until

7 For an overview of the funded consortia, see www.dfg.de/en/research_funding/programmes/nfdi/funded_consortia/index.html.

Figure 2-6:
Participations of research institutions in the consortia of the National Research Data Infrastructure (NFDI) and resulting cooperative relationships



2020 and 2021, their funding amounts are not included in the overall Funding Atlas statistics, which refer to the reporting period from 2017 to 2019.

2.3.2 Horizon 2020 – EU Framework Programme for Research and Innovation

In the EU member states, national funding for research and innovation is supplemented with funding under the EU framework programme. In 2016, almost one tenth of all public research expenditure in the EU member states resulted from "Horizon 2020 – The EU Framework Programme for Research & Innovation". Horizon 2020 ran for a period of seven years (2014 to 2020) with a budget of approximately €70 billion. The research policy reference framework for Horizon 2020 is the Europe 2020 Strategy (European Commission, 2010: 5), which aims to strengthen the EU's competitiveness, innovation potential, productivity, social cohesion and economic convergence.

Aims of the Three Pillars of Horizon 2020

The Horizon 2020 funding portfolio is divided into three pillars (Excellent Science, Industrial Leadership and Societal Challenges), and two specific objectives (Spreading Excellence and Widening Participation and Science With And For Society). The aim of the first pillar, Excellent Science, is to support excellent researchers and new fields of research, particularly through the European Research Council (ERC) and the programme line Future and Emerging Technologies (FET). Particular importance is also attached to the Marie Skłodowska-Curie Actions, which promote researcher mobility. This pillar also promotes transnational access to research infrastructures and preparatory measures for the establishment of new research infrastructures.

The second pillar of Horizon 2020, Industrial Leadership, is intended to support the development of technologies and innovations as the foundation for new and innovative enterprises. The focal areas of this pillar include the development of key technologies (such as information and communication technologies), the provision of finance for research and development activities, and the fostering of innovation in SMEs.

The third pillar, Societal Challenges, covers seven social policy focus areas regarded as having priority (health, food, energy, transport, environment, security and society in a changing Europe). Each focus area comprises funding for both basic and applied research.

Since the programme was launched, almost 28,500 agreements were concluded between 2014 and 2019, with 140,000 participations from HEIs, non-university research institutions and businesses. The total amount calculated from the funding agreements concluded in this period is approximately €54 billion. The analyses presented in this Funding Atlas are based on this data: this means they derive from a six-year window, since the conclusion of contracts was not evenly distributed over this period, as is the case with the other funding providers, but occurred disproportionately at the beginning of the period. In order to be able to relate the data to those of the other funding providers included in the Funding Atlas, they are converted to a three-year period for the purpose of comparison.[8]

For an overview of the Horizon 2020 programme areas included in the DFG Funding Atlas analyses, see Table Web-38 at www.dfg.de/fundingatlas.

Supporting Top-Level Research – the European Research Council (ERC)

The European Research Council (ERC) is funded under the EU framework programmes. Under the EU Framework Programme for Research and Innovation (2014 to 2020), approximately 17% of the total budget was set aside for the ERC.

The aim of the main ERC programme lines (Starting Grants, Consolidator Grants and Advanced Grants) is to provide individual support for outstanding researchers. In addition, the ERC has set up so-called Synergy Grants, enabling four researchers to carry out an integrated research project. The ERC Starting Grant is aimed at researchers at the beginning of their careers, while researchers who have progressed further in their careers can apply for the ERC Consolidator Grant. The ERC Advanced Grant, meanwhile, is designed for es-

8 See also the Glossary of Methodological Terms under "EU funding" at www.dfg.de/fundingatlas.

tablished researchers. Researchers of any nationality can apply to the ERC, but recipients of ERC grants must be based at a research location in an EU member state or an associated country (e.g. Switzerland, Norway or Israel). It is also possible to move to another research institution within Europe while in receipt of an ERC grant. ERC Synergy Grants also allow for the involvement of a researcher at a host institution based in a third country.

ERC funding has been included in the DFG Funding Atlas since the 2009 edition. As was done for the first time in the 2018 edition of the Funding Atlas, the amounts awarded are shown in the relevant Voronoi diagram for EU funding (see Figure 5-1), differentiated according to the four scientific disciplines as defined by the DFG. This is based on details of the subject expertise of the panel that reviewed an ERC proposal submission. The rankings by HEI presented in chapter 5 on the ERC are not based on funding volumes but on the number of people who benefited directly from ERC funding.

2.3.3 R&D Project Funding by the Federal Government

Public funding is a very important source of financial support for research and development (R&D) in Germany. With respect to HEIs, R&D funding provided by federal ministries has grown significantly in recent years, currently accounting for about 30% of the volume of third-party funding at HEIs (see chapter 2.2).

The federal government essentially provides funding through four different channels. The first is medium- and long-term institutional funding, where an entire research institution is funded by the federal government or jointly by federal and state governments over an extended period of time. These include the institutions of the Fraunhofer-Gesellschaft (FhG), the Helmholtz Association (HGF), the Leibniz Association (WGL) and the Max Planck Society (MPG). The second option is contract research, where research contracts are awarded to third parties under public procurement law. The third option is an R&D tax incentive, which has been available since January 2020. Project funding by federal ministries is the fourth option: this is open to HEIs, non-university research institutions and commercial enterprises, who can submit proposals for research projects subject to a limited time frame under funding schemes and specific subject-oriented programmes. Funding is available both for individual projects and collaborative projects involving several partners (BMBF, 2016: 55f.).

Direct and indirect project funding is available: indirect project funding provides research institutions and companies with assistance for such aspects as research infrastructure, research cooperations and innovative networks, while direct project funding is geared towards concrete research fields defined in thematic calls for proposals. Project funding is provided under funding schemes or subject-specific programmes for a project, limited to a certain period of time (BMBF, 2016: 55f.). It is this direct project-oriented funding that the analyses presented in the DFG Funding Atlas focus on.

The Funding Atlas is based on data drawn from the PROFI database (Project Funding Information System) maintained by the Federal Ministry of Education and Research (BMBF), which largely covers direct federal government project funding in the civil sector.[9] In addition to BMBF funding measures, funding programmes run by other ministries are also taken into account. These include in particular the Federal Ministry for Economic Affairs and Climate Action (BMWK), the Federal Ministry of Food and Agriculture (BMEL), the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) and the Federal Ministry of Justice (BMJ). The total amount of funding from this source considered in the Funding Atlas is around €11.6 billion. In contrast to previous editions, funding provided by the Federal Ministry of Transport and Digital Infrastructure (BMVI) is not included here. This accounted for around 2% of funding in the DFG Funding Atlas 2018.[10]

For an overview of federal R&D project funding reported in the DFG Funding Atlas, see Table Web-39 at www.dfg.de/fundingatlas.

9 See also https://foerderportal.bund.de/foekat.

10 See also the Glossary of Methodological Terms under "Federal government funding" at www.dfg.de/fundingatlas.

2.3.4 Alexander von Humboldt Foundation (AvH)

The Alexander von Humboldt Foundation promotes collaborative research ventures involving excellent foreign and German researchers. The AvH awards both research scholarships and research prizes under its funding programmes. The most important selection criterion applied by the AvH is proof of excellent individual qualifications. The very best established researchers and early-career investigators receive funding – regardless of their regional origin or subject specialisation. Unlike the funding providers mentioned so far, the AvH sponsors individuals rather than projects. AvH expenditure in 2019 was around €134 million (AvH, 2020: 44).

Researchers from other countries can apply for AvH fellowships, too. They are aimed at both postdocs and experienced researchers who obtained their doctorate some time ago, and who are usually already working as assistants or as heads of junior research groups, or hold a professorship. Fellowship holders not only specify their own research topic, they also get to select for themselves which host institution in Germany they believe is best suited to their needs.

The Alexander von Humboldt Professorship encourages world-leading researchers to work in Germany on a long-term basis. Here,

Table 2-2:
The most frequent countries of origin of AvH-funded researchers 2015 to 2019

Research visits by prize winners			Research visits by fellows		
Country of origin	N	%	**Country of origin**	N	%
USA	451	41.8	China	607	11.9
United Kingdom	88	8.2	USA	566	11.1
Canada	58	5.4	India	374	7.3
Japan	56	5.2	United Kingdom	248	4.8
France	48	4.4	Italy	222	4.3
Israel	31	2.9	Brazil	178	3.5
Italy	31	2.9	Spain	177	3.5
Australia	25	2.3	France	165	3.2
China	23	2.1	Australia	151	3.0
Netherlands	22	2.0	Canada	148	2.9
Switzerland	21	1.9	Russia	140	2.7
Argentina	19	1.8	Japan	118	2.3
Spain	18	1.7	Iran	113	2.2
Brazil	12	1.1	Nigeria	109	2.1
Poland	12	1.1	Argentina	97	1.9
Russia	12	1.1	Poland	86	1.7
India	11	1.0	Netherlands	76	1.5
Germany	10	0.9	Egypt	72	1.4
New Zealand	9	0.8	South Korea	69	1.3
Belgium	8	0.7	Cameroon	65	1.3
			Turkey	65	1.3
Total	**965**	**89.4**	**Total**	**3.846**	**75.2**
Other	**114**	**10.6**	**Other**	**1,271**	**24.8**
Overall	**1,079**	**100.0**	**Overall**	**5,117**	**100.0**
Based on: N countries	**66**		**Based on: N countries**	**116**	

Note: Corresponds to Tabelle 2-7 of the DFG Förderatlas 2021.

Data basis and source:
Alexander von Humboldt Foundation (AvH): Research visits by AvH guest researchers from 2015 to 2019.
Calculations by the DFG.

Table 2-3:
The most frequent countries of origin of DAAD-funded researchers 2015 to 2019

Research visits by researchers			Research visits by graduates		
Country of origin	N	%	**Country of origin**	N	%
Russia	534	14.3	Russia	1,595	5.4
China	332	8.9	India	1,516	5.1
Italy	200	5.4	Mexico	1,355	4.5
USA	131	3.5	Pakistan	1,341	4.5
Poland	130	3.5	Egypt	1,163	3.9
Ukraine	129	3.5	Colombia	1,120	3.8
Germany	115	3.1	Syria	951	3.2
Argentina	113	3.0	Turkey	844	2.8
France	100	2.7	USA	832	2.8
India	92	2.5	Brazil	808	2.7
Georgia	84	2.3	Iran	728	2.4
Egypt	73	2.0	Ethiopia	721	2.4
Turkey	73	2.0	Indonesia	677	2.3
Brazil	60	1.6	Ghana	649	2.2
Armenia	51	1.4	Kenya	558	1.9
United Kingdom	49	1.3	Ukraine	551	1.8
Spain	48	1.3	Argentina	541	1.8
Uzbekistan	48	1.3	Chile	540	1.8
Hungary	45	1.2	Italy	538	1.8
Canada	43	1.2	China	520	1.7
Total	**2,450**	**65.8**	**Total**	**17,548**	**58.9**
Other	**1,274**	**34.2**	**Other**	**12,249**	**41.1**
Overall	**3,724**	**100.0**	**Overall**	**29,797**	**100.0**
Based on: N countries	**122**		**Based on: N countries**	**156**	

Note: Corresponds to Tabelle 2-8 of the DFG Förderatlas 2021.

Data basis and source:
German Academic Exchange Service (DAAD): Research visits by DAAD guest researchers and graduates 2015 to 2019.
Calculations by the DFG.

awards are worth €3.5 to €5 million and enable an individual to carry out research in Germany for a period of five years. Distinguished early-career researchers can apply for the Sofja Kovalevskaja Award in order to build up a working group and spend five years working on a research project of their own choice at a research institution in Germany. The AvH's funding programmes also include numerous other awards and fellowships for research stays in Germany.[11]

Based on AvH data, the DFG Funding Atlas presents key indicators on the international attractiveness of German research institutions. In the following, only those AvH programmes are considered that enable foreign researchers to stay in Germany.[12] While Table 2-2 provides a general overview of the most common countries of origin of AvH funding recipients, the same data is subjected to a more detailed comparative analysis in chapter 3.2.

2.3.5 German Academic Exchange Service (DAAD)

The German Academic Exchange Service, like the DFG, is an association under private law. It is one of the largest organisations in the

11 www.humboldt-foundation.de/en

12 See also the Glossary of Methodological Terms under "AvH funding" at www.dfg.de/fundingatlas.

world that supports international exchanges among students and researchers. Most of the DAAD budget is provided by the ministries of the German federal government, for example the Federal Foreign Office, the Federal Ministry of Education and Research (BMBF) and the Federal Ministry for Economic Cooperation and Development (BMZ). Other important funding providers are the European Union and the German federal states. In 2019, the DAAD budget was approximately €600 million (DAAD, 2020: 145).

The DAAD mainly awards scholarships to students, graduates and researchers, offering around 100 of them to individuals from all countries and in all subject areas. A general overview is provided by the DAAD scholarship database[13], which can also be searched for information about scholarships offered by other funding sources such as the Foundation of German Business and the Volkswagen Foundation. In addition to individual funding, one essential task of the DAAD is to strengthen the internationalisation of German HEIs through institutional funding (project funding). Details of the DAAD funding portfolio are provided in the breakdowns contained in the DAAD annual report (DAAD, 2020: 112ff.).

For the comparative analyses of funding-based indicators in the chapters that follow, only the group of established researchers is taken into account. Together with recipients of AvH and ERC funding, this provides a suitable indicator of the attractiveness of German research institutions within the global scientific community. As a supplement to this, Table 2-3 also shows the countries of origin of DAAD-funded graduates.[14] In Chapter 3.2, which looks at the international dimension of research funding in Germany, DAAD and AvH data are considered together to make statements about the international origin of visiting researchers whose stays are funded by these two organisations.

13 See www2.daad.de/deutschland/stipendium/datenbank/en/21148-scholarship-database.

14 See also the Glossary of Methodological Terms under "DAAD funding" at www.dfg.de/fundingatlas.

3 International Aspects of Research Funding

As outlined in the previous chapter, researchers at German higher education institutions also acquire significant funding from the EU (incl. ERC); in 2019, the share of third-party funding income for HEIs as a whole from this source was around 10% (see Figure 2-3). As a rule, acquisition of EU funds is linked to partnerships with researchers in other EU countries and beyond. This chapter takes a closer look at these partnerships. In addition to considering funding under Horizon 2020 overall, the focus here is particularly on funding provided by the European Research Council (ERC). We then go on to provide additional analyses of the countries of origin of researchers participating in selected DFG Coordinated Programmes and compare the relevant priorities with the countries of origin of those receiving funding from the Alexander von Humboldt Association (AvH) and the German Academic Exchange Service (DAAD). The chapter concludes with an examination of the most frequent partner countries to which DFG funding recipients across all programmes refer in their proposals when listing cooperation partners.

3.1 Funding under Horizon 2020

The previous chapter presented an overview of funding under Horizon 2020 – EU Framework Programme for Research and Innovation. In the period of 2014 to 2019 under review here, Brexit (DFG, 2019: 81) – an issue already discussed at length in the 2018 edition of the DFG Funding Atlas – did not yet have any impact on funding developments. In the next edition of the Funding Atlas, therefore, the analysis that follows here will provide the baseline by which it will be possible to judge any change resulting from the UK's departure from the European Union.

In order to be able to draw conclusions regarding internal European cooperation and programme participation, the following analyses focus on the EU-28 and the associated countries participating in Horizon 2020[1].

Significant National Differences in Sectoral Participation under Horizon 2020

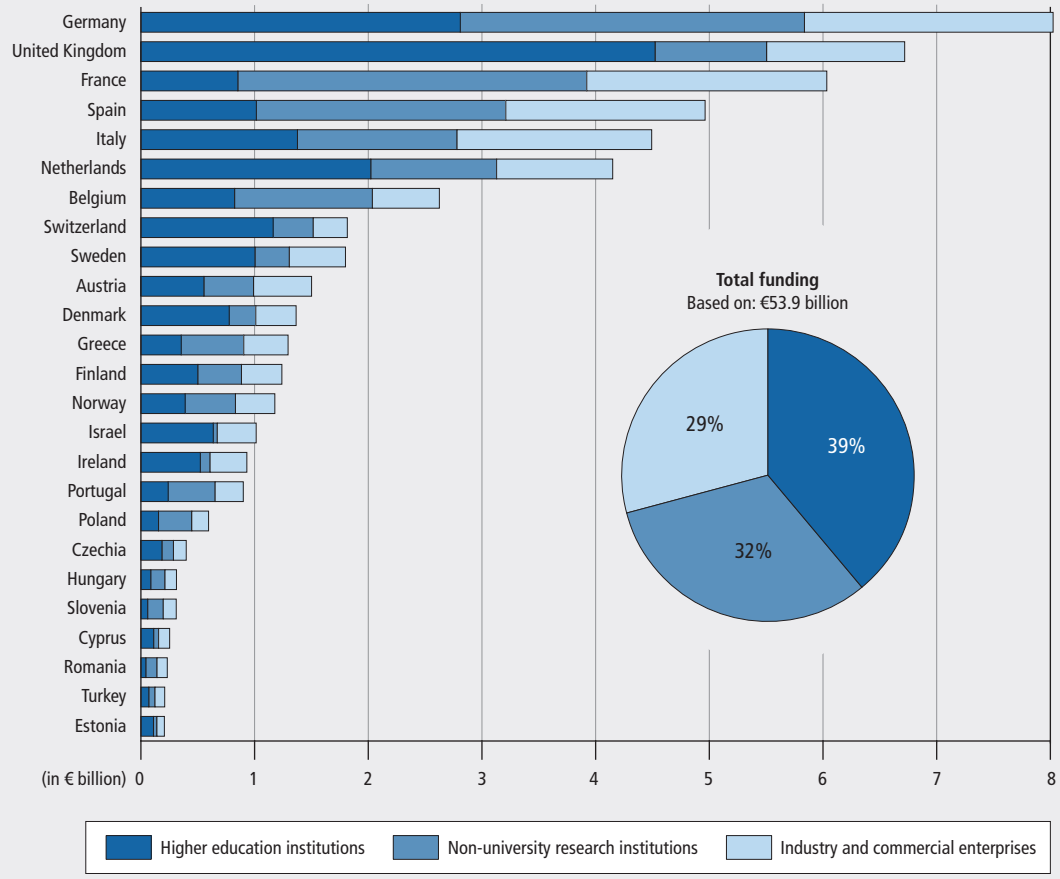
If we first take a look at total participation (see Figure 3-1), it is clear that Germany dominates research activity under Horizon 2020 with a good €8 billion. The UK and France follow at a clear distance, followed in turn by Spain, Italy and the Netherlands. A comparison with the 2018 edition of the Funding Atlas (DFG, 2018: 82) indicates that the gap between Germany and the UK has widened significantly from 8% to 16%. It can be assumed here that this effect will have been caused by a reorientation of researchers even before the actual implementation of Brexit (which occurred on 31 January 2020).

A differentiated view of the funding recipients by the sector (HEIs, non-university research institutions, industry and commerce) in which project partners involved carried out their research project enables conclusions to be drawn about the relative significance of each sector for the country in question.

All in all, the share of funding allocated to commercial enterprises is about 29% on average for all countries considered here. Germany has a slightly lower commercial share of just over 27%. The other two large groups of recipients are HEIs (35%) and non-university research institutions (38%) (see Figure 3-1). A comparative analysis shows that these levels of participation differ significantly between the EU countries. While in the UK, Switzerland and Israel, for example, over 60% of EU funding is allocated to the higher education sector, France sees a considerably

1 See also the Glossary of Methodological Terms at www.dfg.de/fundingatlas under "EU funding".

Figure 3-1:
Funding in Horizon 2020 – EU Framework Programme for Research and Innovation 2014 to 2019 by country and type of funding recipient



Note: Corresponds to Abbildung Web-1 of the DFG Förderatlas 2021.

Data basis and source:
EU Office of the BMBF: Participation in Horizon 2020. EU Framework Programme for Research and Innovation (project data as of 12 May 2020). Calculations by the DFG.

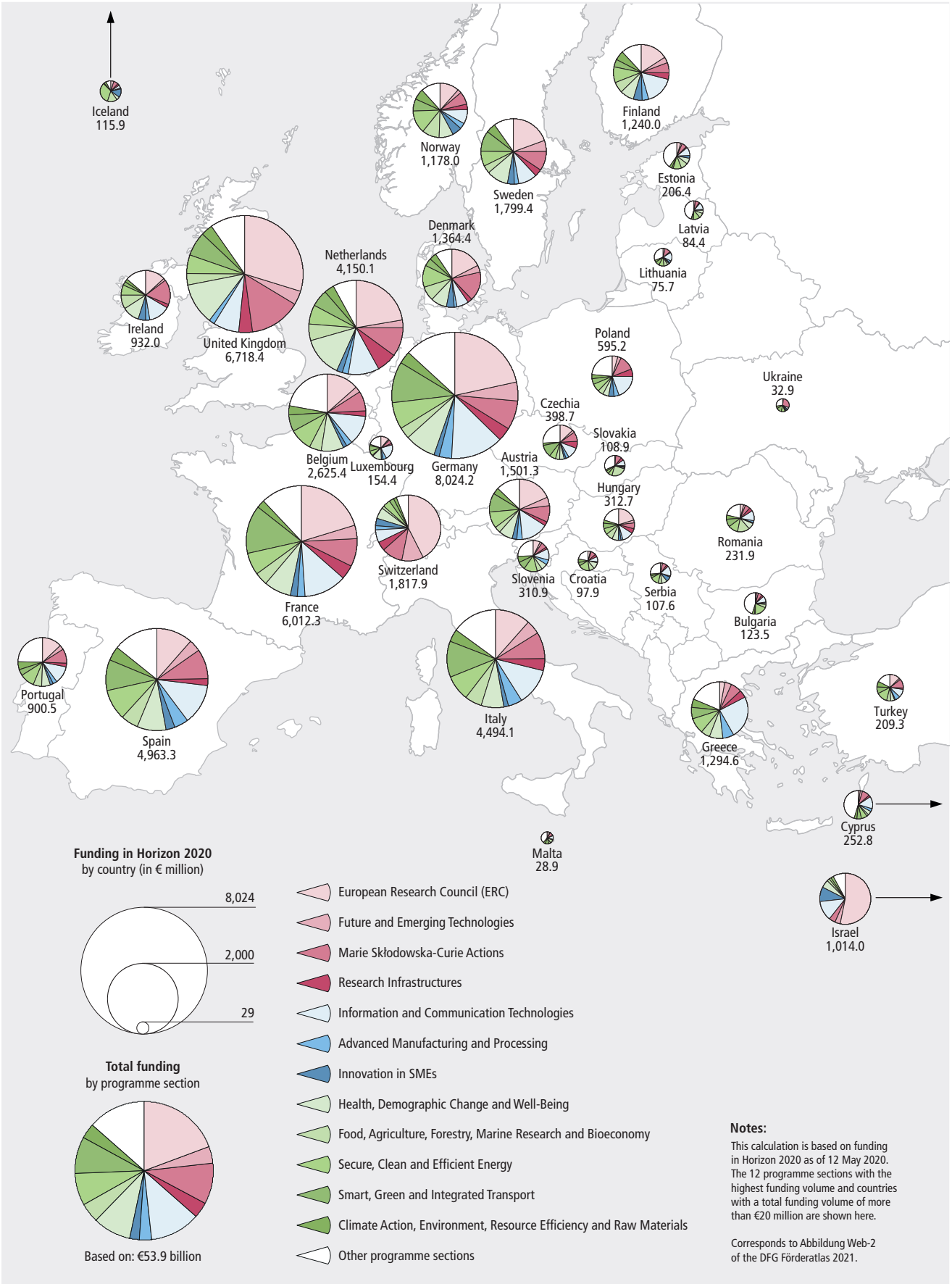
higher share of funding going to non-university research institutions (such as CNRS, INRA and INSERM). The same applies to Poland and Belgium. Meanwhile, more intense involvement on the part of industry tends to be found in smaller countries whose public research sector is not as strong, which is why individual industrial companies in these countries account for larger shares of EU funding. Notable examples here include Turkey, Romania and Cyprus, though in Italy, too, industry accounts for at least 38%.

Very Similar Pattern in the Thematic Distribution of Funding

Figure 3-2 visualises the distribution of all funding acquired across the various thematic priorities as well as for the other specific programmes for all countries with a funding volume of more than €20 million. The twelve programme areas with the highest funding volumes are listed individually (see Table Web-38 at www.dfg.de/fundingatlas).

Looking at the country-specific funding profiles, what is most striking in the case of Germany is the disproportionately large share of funding for information and communication technology, which is largely the result of the involvement of industry. For the UK, as well as for Switzerland and Israel, there is strikingly high share in the cross-thematic and cross-disciplinary funding areas covered by the Ideas, People and Capacities programmes. This is mainly due to the excellent performance of these countries in obtaining ERC grants.

Figure 3-2:
Funding in Horizon 2020 – EU Framework Programme for Research and Innovation 2017 to 2019
by country and programme section



Countries of Destination of ERC Funding Recipients: Germany Ranks Second

Figure 3-3 illustrates how these grants are distributed among countries and scientific disciplines. Here it can be seen that, as in the previous reporting period, research bases in the UK rank first with a total of 939 ERC grants (almost one fifth of all ERC awards, see Table 3-1 and Figure 3-3). Germany follows with 806 grants, while France obtained 580 grants. An analysis by scientific discipline shows a further differentiated pattern (see Figure 3-3).

The UK emerges as a country with a high level of participation in all four areas, for example; the humanities and social sciences are particularly well represented here, accounting for a third of all ERC grantees. A similar level of relative strength is to be seen in the Netherlands. ERC grantees in Germany and France, on the other hand, are relatively often engaged in the life or natural sciences, and these two countries are also relatively strongly represented in the engineering sciences (with a share of around 20%). Switzerland (25%) and Spain (30%) achieve higher percentages in the engineering sciences.

Two-Thirds of German ERC Grantees Remain in Germany

Finally, Table 3-1 provides information on the countries of destination of German ERC grantees, and also on the countries of origin of ERC grantees who have chosen to spend time in Germany based on the relevant funding.

About two out of three ERC grantees active in Germany choose a research institution in their own country. Among the other destination countries, Switzerland, the United Kingdom and the Netherlands in particular provide attractive framework conditions for a larger number of German ERC grantees. Here, too, future analyses will show to what extent the current political discussion about the status of Switzerland and the UK – which are currently not associated with Horizon 2020[2] – has an impact on the choice of destination countries among German ERC grantees.

2 https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/common/guidance/list-3rd-country-participation_horizon-euratom_en.pdf

Germany – Still Leading as a Country of Origin of ERC Grantees

With regard to the country of origin of ERC grantees, Germany still ranks first with a total of 825 ERC-funded researchers, followed by France (508 ERC grantees) and the UK (503 ERC grantees). It is also worth mentioning that 167 ERC grantees came to Europe from the USA during the period under review. This is not least thanks to the dedicated information campaigns conducted by the ERC in North America as well as in other selected target regions (Australia, Brazil, China, India, New Zealand and South Africa). It is also worth noting the high number of ERC grantees from comparatively small countries which nonetheless have a strong research profile, such as the Netherlands (341 ERC grantees) and Israel (281 ERC grantees): these two countries alone account for a good 12% of all ERC funding. In total, ERC grantees come from almost 80 countries in the period under review.

A separate analysis by funding line shows that Germany's leading position in terms of the nationality of ERC grantees applies across all funding lines. 17% of the top researchers in receipt of funding are from Germany. This is particularly noteworthy for established researchers in the Advanced Grants programme line, even though in terms of absolute numbers, the United Kingdom, with 203 ERC grantees, is still just ahead of Germany (200). The high proportion of ERC grantees of German origin is an indication of the marked international competitiveness of the German science system in training excellent early-career researchers and supporting them as they progress along their career trajectories.

3.2 International Mobility in DFG-Funded Consortia

The analysis presented below refers to data on research assistants involved in DFG-funded Collaborative Research Centres and Research Training Groups as well as Graduate Schools and Clusters of Excellence under the Excellence Initiative funded by the German federal government and federal states. For these funding instruments, the DFG conducts annual surveys on approximately 55,000 people at all career stages (from doctoral students and postdocs through to professors) who are

Figure 3-3:
ERC-funded researchers 2014 to 2019 by country of destination and scientific discipline

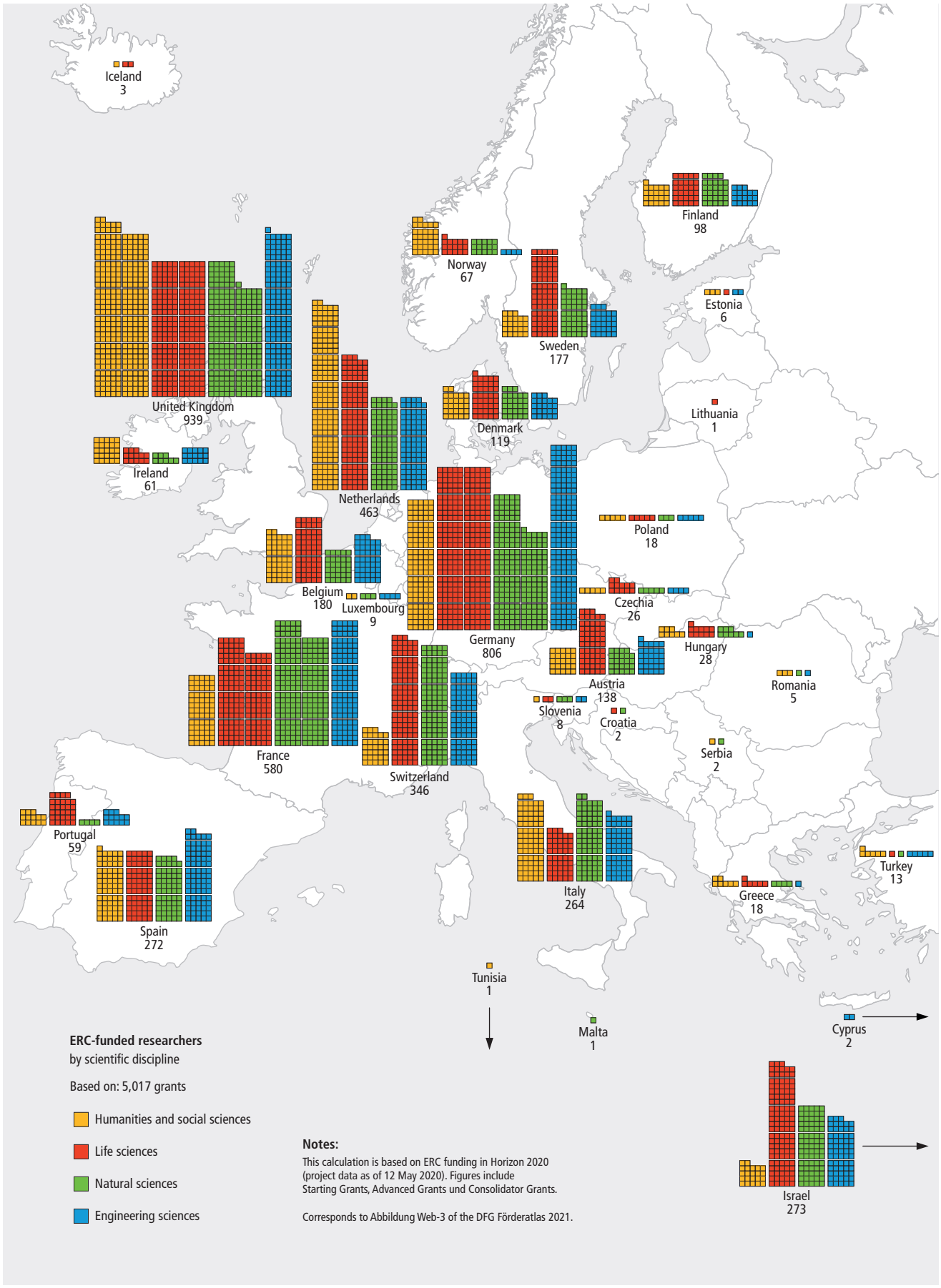


Table 3-1:
The most frequent countries of origin and destination of ERC-funded researchers 2014 to 2019

Number of funding recipients by countries of origin						Number of funding recipients by countries of destination				
Country of origin	Total	of which:				Country of destination	Total	of which:		
		Starting Grants	Advanced Grants	Consolidator Grants	Destination Germany			Starting Grants	Advanced Grants	Consolidator Grants
	N	N	N	N	N		N	N	N	N
Germany	855	376	200	279	555	**Germany as country of origin**				
France	512	227	108	177	15	Germany	555	229	142	184
United Kingdom	506	150	205	151	18	Switzerland	75	32	21	22
Italy	471	212	94	165	25	United Kingdom	73	38	11	24
Netherlands	341	148	97	96	12	Netherlands	36	20	6	10
Spain	296	114	69	113	18	Austria	27	9	8	10
Israel	282	157	44	81	3	France	21	9	7	5
Belgium	180	71	48	61	4	**Total**	**787**	**337**	**195**	**255**
USA	171	84	47	40	31	**Other**	**68**	**39**	**5**	**24**
Switzerland	145	44	57	44	12	**Overall**	**855**	**376**	**200**	**279**
Sweden	126	48	43	35	4	**Based on: N countries**	**21**	**19**	**11**	**15**
Austria	113	58	22	33	21					
Finland	91	37	16	38		**All funding recipients**				
Denmark	89	34	25	30		United Kingdom	939	364	254	321
Portugal	88	45	10	33	3	Germany	806	353	199	254
Greece	72	30	15	27	16	France	580	249	134	197
Ireland	62	33	12	17	2	Netherlands	463	230	94	139
Canada	54	31	6	17	4	Switzerland	346	139	108	99
Hungary	47	20	9	18	3	Israel	273	151	44	78
Poland	43	29	2	12	1	Spain	272	109	63	100
Total	**4,544**	**1,948**	**1,129**	**1,467**	**747**	**Total**	**3,679**	**1,595**	**896**	**1,188**
Other	**473**	**262**	**49**	**162**	**59**	**Other**	**1,338**	**615**	**282**	**441**
Overall	**5,017**	**2,210**	**1,178**	**1,629**	**806**	**Overall**	**5,017**	**2,210**	**1,178**	**1,629**
Based on: N countries	**78**	**67**	**42**	**56**	**44**	**Based on: N countries**	**38**	**34**	**28**	**32**

Note: Corresponds to Tabelle Web-35 of the DFG Förderatlas 2021.

Data basis and source:
EU Office of the BMBF: ERC funding 2014 to 2019 in Horizon 2020. EU Framework Programme for Research and Innovation (project data as of 12 May 2020).
Figures include Starting Grants, Advanced Grants and Consolidator Grants.
Calculations by the DFG.

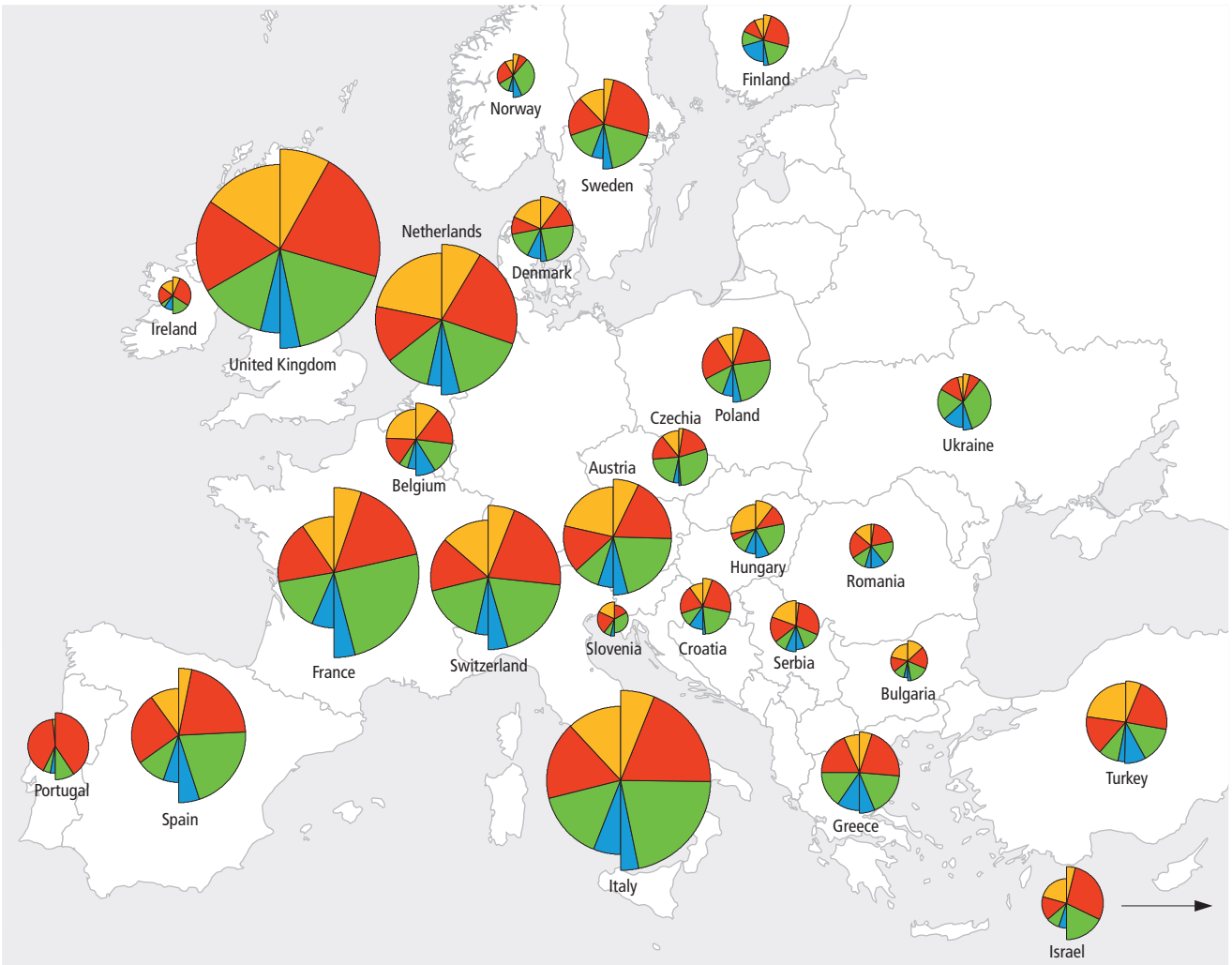
instrumental in shaping the research programme within the respective consortia.[3]

These surveys demonstrate that around 20% of individuals surveyed in 2019 had worked at a research institution abroad prior to their involvement in a research group. There are slight differences between the funding instruments. In the consortia of the Excellence Initiative and the Excellence Strategy, i.e. Clusters of Excellence and (expiring) Graduate Schools, the proportion of researchers who previously worked abroad is 24%, while in those of the Collaborative Research Centres and Research Training Groups it is around 16.5% – an indication that the Excellence Initiative and the Excellence Strategy run by the federal government and federal states are attracting considerable international attention, thereby making a key contribution to the success of international recruitment in the area of collaborative research in Germany.

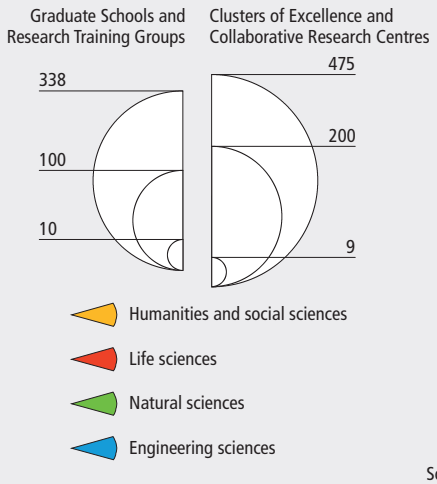
Figure 3-4 shows the most frequently represented countries of origin in Europe in cartographic form, broken down by the four DFG scientific disciplines, as well as other

3 See also the Glossary of Methodological Terms under "DFG annual survey" at www.dfg.de/fundingatlas and www.dfg.de/erhebungen.

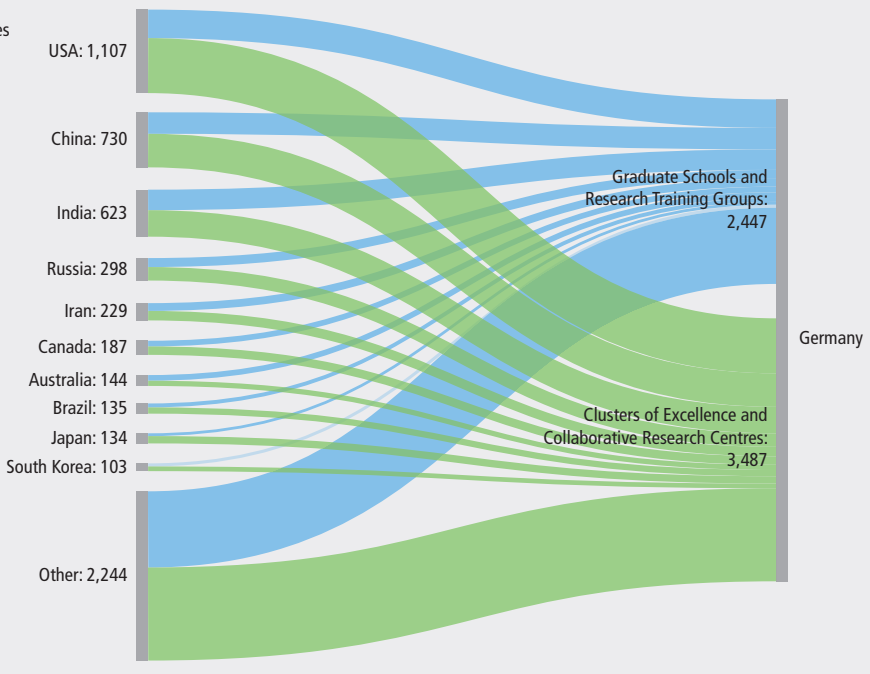
Figure 3-4:
Countries of origin of researchers participating in Graduate Schools, Research Training Groups, Clusters of Excellence and Collaborative Research Centres 2019



Participants by country of origin



Participants from other countries of origin



Notes:

This calculation is based on the countries of origin of researchers prior to participation in Graduate Schools (2,694), Research Training Groups (1,732), Clusters of Excellence (2,761) and Collaborative Research Centres (3,682) from the DFG monitoring 2019. Countries with 20 or more persons are shown here.

Corresponds to Abbildung 3-6 of the DFG Förderatlas 2021.

countries worldwide (not differentiated by subject) in the form of a flow chart.

If we first look at the non-European countries of origin, the ranking of the four most frequent countries – the USA, China, India and Russia – is the same as that of the last Funding Atlas, which was based on figures for the reporting year 2016; the countries that follow, Canada and Iran, have swapped positions. While the absolute number of people coming from the USA has remained largely stable, China in particular has seen a significant increase.

In Europe, the United Kingdom continues to be the largest country of origin, with as many as 813 researchers participating in the above-mentioned DFG programmes coming from that country, followed by Italy (649), France (493), the Netherlands (481) and Switzerland (408). Particularly with regard to France, it is striking that Collaborative Research Centres and Clusters of Excellence motivate significantly more guests to spend time researching in Germany than is the case with Research Training Groups geared towards graduate education or the (expiring) Graduate Schools.

Figure 3-5 enables a comparison to be made both with the DFG figures and also between the AvH and DAAD. There are significant differences to be seen between the latter in some cases. The map of Europe shows a number of countries with a high level of participation in the AvH's guest programmes but with little or no involvement in DAAD programmes – including Switzerland, Belgium, Austria, Israel and the Nordic countries. The largest European AvH country of origin is by far the United Kingdom, followed by Italy and France (as is the case with DFG funding) and Spain (ranked 6th with the DFG). Most DAAD-funded guests come from Italy, Poland, Ukraine and France, and quite often from Georgia and Armenia, too.

Outside Europe, as with the DFG, most AvH and DAAD funding recipients come from the USA and China, followed by Russia and India.

A comprehensive range of information on international mobility is provided by the annual reporting system Wissenschaft weltoffen: funded by the BMBF and with an extensive online supplement, this provides a detailed account of the international dimension of study and research in Germany.[4]

4 www.wissenschaft-weltoffen.de

3.3 International Cooperation in DFG Project Funding

With regard to international cooperation, the last Funding Atlas already emphasised the high priority that is commonly attached to bilateral cooperation agreements between the DFG and foreign funding organisations (DFG, 2018a: 72ff.). Such agreements often act as an initial "door-opener" that enable researchers to enter into collaborative relationships. This kind of international collaboration is frequently based on existing contacts among the funding recipients. The following analyses show how these kinds of contact in the world of science are used to engage in DFG-funded projects.

As part of the proposal submission process, researchers provide information on aspects such as which international partners they would like to collaborate with if their proposal is approved. This information is recorded in the database maintained to support proposal handling, so it can also be used for the purpose of statistical analysis. Collaboration can take many different forms: it might be an International Research Training Group bringing together doctoral researchers from one or more countries, a host project manager enabling a funded individual to participate in their project at the respective research institution for a limited period of time, a partner taking responsibility for certain methodological sub-packages or, finally, a company based abroad that is called upon to provide certain services – the spectrum is almost unlimited.

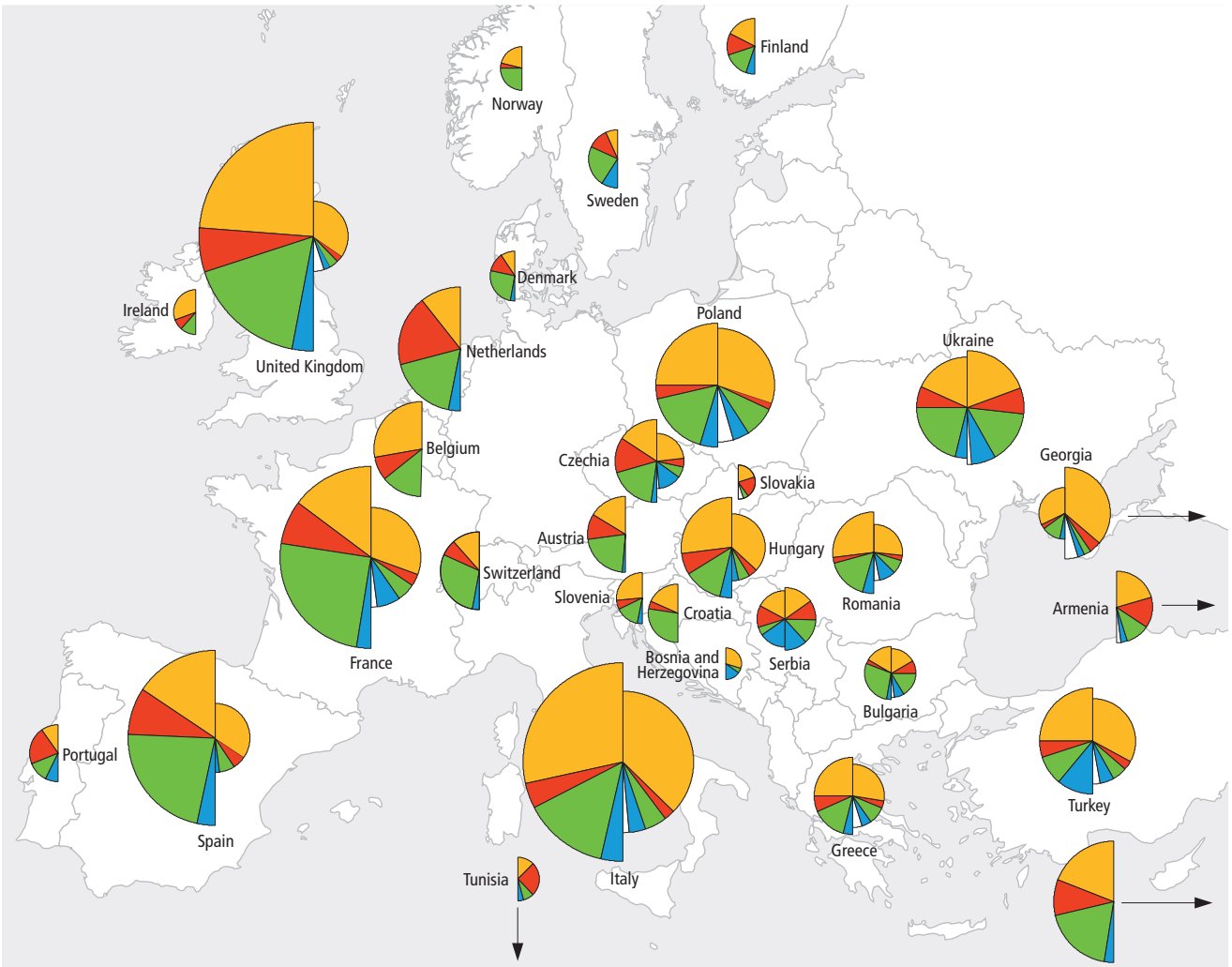
DFG Funding Recipients Collaborated with Partners in 126 Different Countries Worldwide

Based on awards from 2017 to 2019 and taking all DFG funding instruments as a basis (excluding collaborations under the Excellence Initiative and the Excellence Strategy), Figure 3-6 shows[5] the main countries involved in such collaborative activities. All countries are shown for which at least ten jointly processed DFG projects are listed in the period under review.

International collaborations clearly involve research partners on all continents. In Western Europe, the main countries of partners

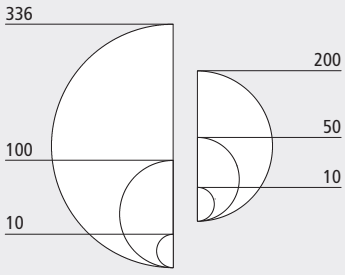
5 See also the Glossary of Methodological Terms under "International participations" at www.dfg.de/fundingatlas.

Figure 3-5:
AvH- and DAAD-funded researchers 2015 to 2019 by country of origin and scientific discipline



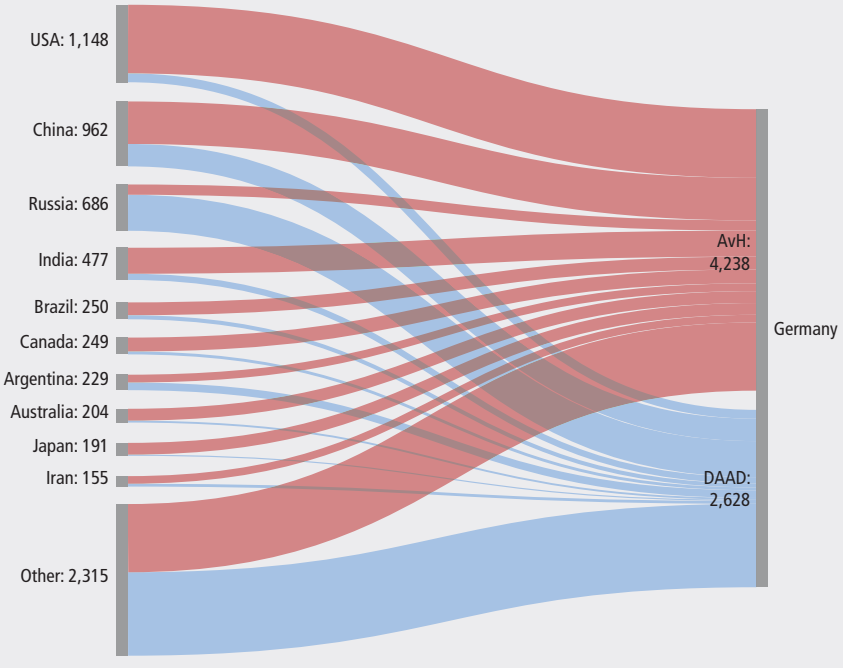
Funding recipients by country of origin

AvH funding recipients DAAD funding recipients



- Humanities and social sciences
- Life sciences
- Natural sciences
- Engineering sciences
- Classification not possible

Funding recipients from other countries of origin

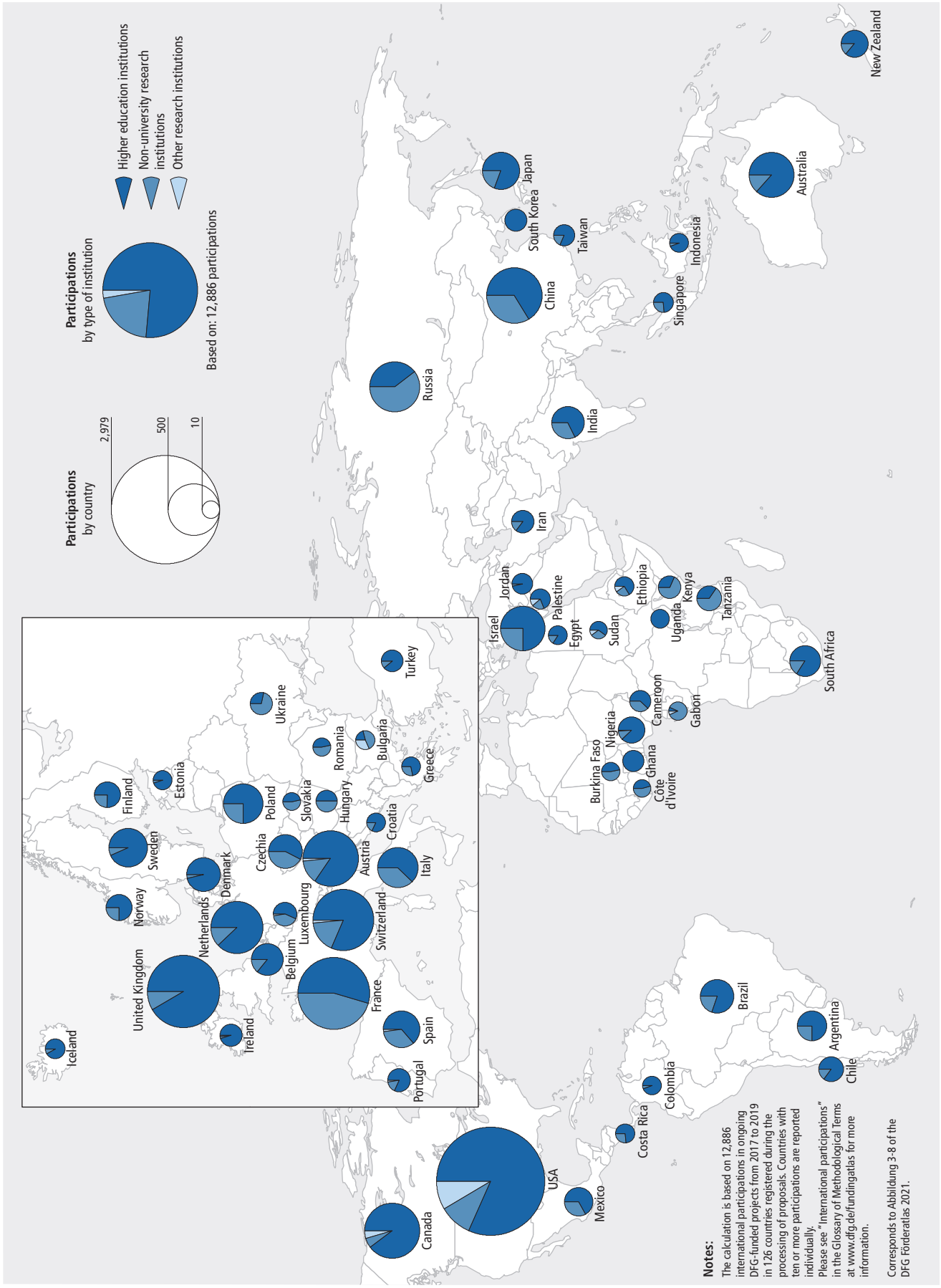


Notes:

Calculations are based on the countries of origin of researchers from 6,196 AvH-funded and 3,724 DAAD-funded research visits to Germany from 2015 to 2019. Countries with 10 or more AvH or DAAD funding recipients are shown here.

Corresponds to Abbildung 3-7 of the DFG Förderatlas 2021.

Figure 3-6:
International participations of research institutions in DFG-funded projects from 2017 to 2019 by country



participating in DFG-funded projects are France, Switzerland, Austria, the UK and the Netherlands. In Eastern Europe, there are larger numbers of partners from the Czech Republic and Poland, while Russia is an important partner country, too.

Worldwide, DFG-funded projects are most often carried out with partners from the USA, though China, Australia, Canada and Israel are also frequently chosen. In Asia, Japan and India dominate alongside China, while in Central and South America, partners tend to be from Brazil, Argentina and Chile. On the continent of Africa, cooperation focuses on countries in central Africa, such as Nigeria, Ghana and Cameroon, as well as Uganda, Kenya and Tanzania, which are situated further east. The latter include projects relating to common medical or veterinary diseases, such as "The investigation of the effect of neglected diseases on the transmission of Plasmodium falciparum" and "The molecular epidemiological network initiative to promote the use of live vaccines against Theileria parva and Theileria annulata infections in East and North Africa", as well as projects in the field of agriculture. For each of the partner countries, the map shows the types of institution to which the collaborations relate in each case. All in all, cooperation with partners based at foreign HEIs clearly predominates: they account for a share of 76%. Nonetheless, there are very considerable differences between the countries in this respect. While HEIs clearly account for the majority of partnerships in Denmark at 96% and in the UK at 91%, for example, collaborative ventures in France often involve partnerships with non-university institutions due to the structure of the French science landscape, so the figure for that country is only 55%. Partners here are most commonly based at institutes of the Centre national de la recherche scientifique (CNRS).

In Russia, too, collaborations tended to involve non-university research institutions, such as the Academy of Sciences. Gabon, Ukraine, Kenya, Tanzania and Côte d'Ivoire also reflect a high share in this respect.

Generally High Correlation between the Intensity of Cooperation with a Country and the Strength of its Research Profile

There are many different structural factors that influence cooperation with researchers from certain countries. Is the country nearby or far away? Is it comparatively easy to communicate in a common language of science (usually English)? Are there political factors that tend to make cooperation easier or more difficult? Does a country really have a sufficiently developed and therefore attractive research infrastructure that is conducive to cooperation? And finally, to what extent does the strength of a country's overall research profile have a role to play? In order to provide a differentiated answer to these questions, it is useful to compare DFG-funded collaborations with the funds that the countries themselves spend each on research and development.

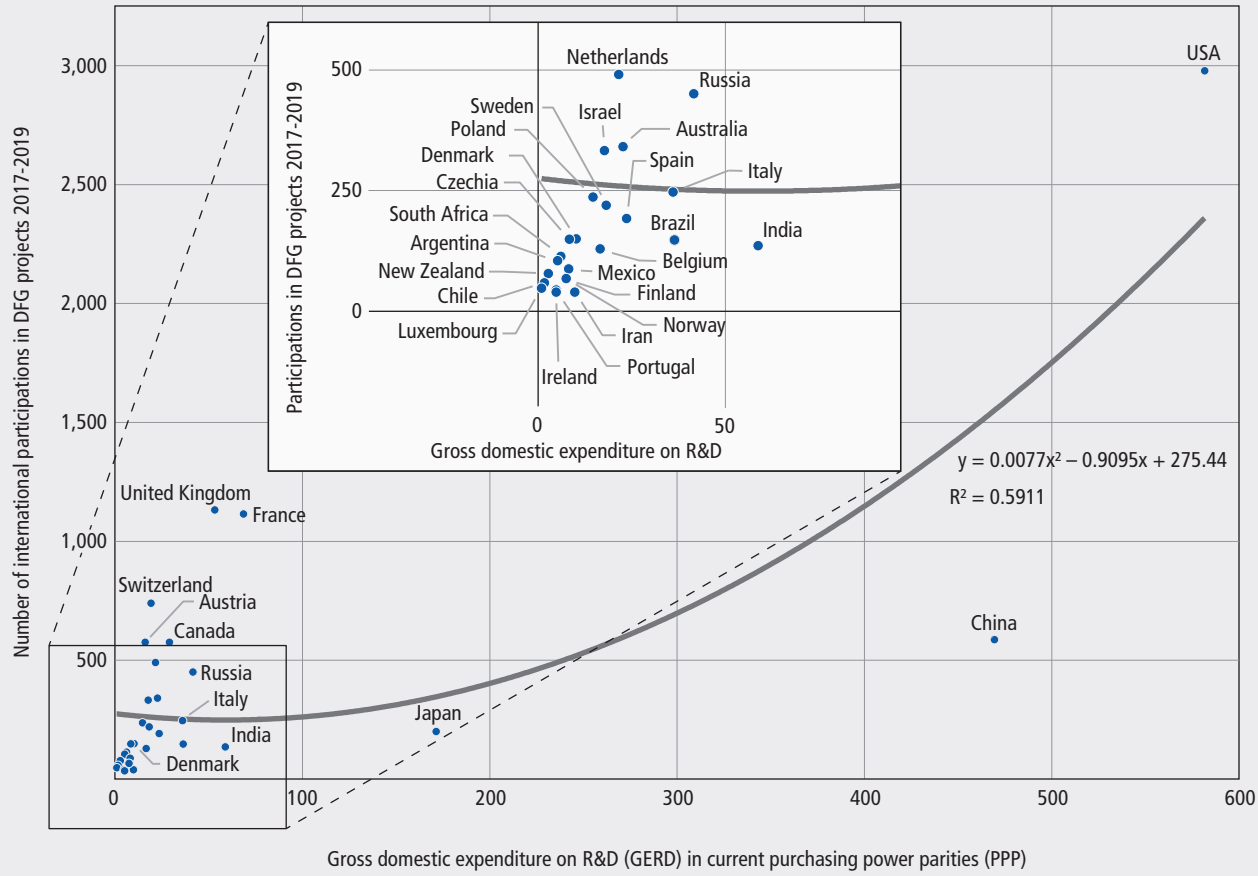
The latter information provided by the OECD and UNESCO already featured in chapter 2[6], where it provided the basis for an international comparison of Germany's research expenditure.

As Figure 3-7 indicates, there is indeed a correlation here, as can be seen from the coefficient of determination R 2=0.59 of the (polynomial) regression line. The maximum figure determined above for the USA – for which almost 3,000 collaborations were recorded during the period under review – proves to be "in line with expectations" in this breakdown, i.e. it corresponds to what the scope of the R&D volume suggests based on the intensity of collaboration. Here it is interesting to compare those countries where the number of actual collaborations deviates from the expected figure. China is initially striking here: it is the country that allocates the second-highest amount to research and development after the USA. In a similar way to Japan (which has the third-highest R&D volume in absolute terms), collaboration figures are significantly below expectations based on statistical regression, as is the case with India, which has the fifth-highest R&D budget after France.

By contrast, it is primarily the United Kingdom, France, Switzerland, Austria and the Netherlands that enter into an above-average number of project partnerships with DFG funding recipients in Germany relative to their absolute R&D volume. Outside Europe, this also applies to Canada, Australia, Israel and Russia.

6 See Figure 2-1, which shows the countries with the highest R&D expenditure in 2018 and the countries with the highest R&D rates (broken down by sector).

Figure 3-7:
International cooperation intensity among DFG-funded projects and research expenditure on the part of the countries



Note: Corresponds to Abbildung 3-9 of the DFG Förderatlas 2021.

Data basis and sources:
Deutsche Forschungsgemeinschaft (DFG, German Research Foundation): DFG awards for 2017 to 2019.
UNESCO Institute for Statistics (UIS): Gross domestic expenditure on R&D (GERD) in current purchasing power parities (PPP). As of March 2021.
Calculations by the DFG.

As a result of the Russian war of aggression against Ukraine that started on 24 February 2022, the DFG and the other major German research organisations decided at the beginning of March 2022 to discontinue for the time being, with immediate effect, all German-Russian collaboration at the institutional level, which until then had been extremely diverse and longstanding[7]. In order to continue supporting science in Ukraine, as well to convey its solidarity, the DFG offers researchers from Ukraine and from Russia a number of targeted support measures, also under an initiative for refugee researchers.

7 www.dfg.de/en/research_funding/announcements_proposals/2022/info_wissenschaft_22_22/index.html

4 Institutions and Regions of Research in Germany

This chapter first presents some general statistics on the funding programmes considered in the Funding Atlas relating to types of research institution. The focus here is on the DFG's funding instruments. For a consideration of specific institutions, the printed version of the Funding Atlas normally concentrates on the 20 to 40 HEIs with the highest award volumes. Detailed analyses of a larger group of HEIs are to be found at www.dfg.de/fundingatlas: these statistics cover a total of around 80 HEIs that meet certain thresholds. The tables published online also provide detailed information on non-university research institutions.

In addition to institutions, this chapter also takes a look at how research is regionally distributed – differentiated in the usual way according to the individual research funding sources included in the Funding Atlas.

In addition to routine reporting, each edition of the DFG Funding Atlas always pursues specific highlights by featuring special analyses. The previous chapter, chapter 3, focused on issues relating to the international dimension of funded research, showing previously unpublished figures about the countries with which DFG programme funding recipients most frequently collaborate. Finally, in chapter 4.4, this Funding Atlas takes the reader back in history: to mark the 100th anniversary of the founding of the DFG's predecessor organisation – the *Notgemeinschaft der Deutschen Wissenschaft* ("Emergency Association of German Science") – in 2020, an analysis is presented which traces the regional and organisational distribution of more than 50,000 proposals (or proposal participations) dating back to the years 1921 to 1945.

4.1 Institution-Based Key Indicators at a Glance

Germany's research landscape is diverse and is not concentrated at a small number of locations. This is shown by the DFG information system GERiT (German Research Institutions), which allows searches of nearly 30,000 institutes at HEIs and non-university research institutions in Germany.[1] GERiT currently lists 437 higher education institutions (117 universities, 263 universities of applied sciences (*Fachhochschulen – FH and Hochschulen für Angewandte Wissenschaften* – HAW) and 57 colleges of music and art), almost 300 institutions belonging to the Fraunhofer-Gesellschaft (FhG), the Helmholtz Association (HGF), the Leibniz Association (WGL) and the Max Planck Society (MPG), and a whole range of other publicly funded research institutions.

GERiT is based on the DFG's Institution Database[2], which is used by the Head Office to support proposal processing. Here, administrators are able to find the addresses of applicants and reviewers in a continuously updated database of around 30,000 institutes, both in Germany and worldwide, and link the information contained in it in standardised form to the details provided in proposal submissions. This offers a wide range of possibilities in terms of statistical analysis: since each institute is classified by subject based on the subject classification system used by the Federal Statistical Office (Destatis), the proposal and review process can be analysed by subject discipline as well as interdisciplinary orientation. What is more, the institution type (university, Max Planck Society, etc.) is classified too, so the system is well suited to analysing the relevant levels of institutional participation. Based on a concordance set up especially for the Funding Atlas – which relates to the institution identifiers of other funding providers to those of the DFG – the relevant metadata can be transferred to the data of

1 www.gerit.org/en

2 See also the Glossary of Methodological Terms under "DFG Institution Database" at www.dfg.de/fundingatlas.

Table 4-1:
Participation[1] in DFG, federal government and EU funding programmes for research by type of institution

Type of institution	DFG awards		Direct R&D project funding from the federal government		Funding under the AiF's IGF programme		R&D funding in Horizon 2020[2]	
	€m	%	€m	%	€m	%	€m	%
Higher education institutions	**8,428.5**	**88.9**	**4,711.9**	**40.6**	**284.8**	**53.5**	**1,404.8**	**35.0**
Non-university research institutions	**1,055.2**	**11.1**	**3,770.3**	**32.5**	**246.5**	**46.3**	**1,513.7**	**37.7**
Fraunhofer-Gesellschaft (FhG)	22.0	0.2	1,313.9	11.3	66.7	12.5	277.9	6.9
Helmholtz Association (HGF)	217.3	2.3	551.2	4.7	1.3	0.2	392.4	9.8
Leibniz Association (WGL)	269.2	2.8	336.3	2.9	16.7	3.1	103.3	2.6
Max Planck Society (MPG)	257.9	2.7	131.3	1.1	0.5	0.1	311.4	7.8
Federal research institutions	58.3	0.6	123.8	1.1	4.4	0.8	50.8	1.3
Other research institutions	230.5	2.4	1,313.7	11.3	156.9	29.5	377.9	9.4
Industry and commercial enterprises			**3,123.7**	**26.9**	**0.6**	**0.1**	**1,093.6**	**27.3**
Overall	**9,483.7**	**100.0**	**11,605.9**	**100.0**	**532.0**	**100.0**	**4,012.1**	**100.0**

[1] Funding for German and institutional recipients only.
[2] For comparison purposes, the funding amounts for Horizon 2020 shown here have been converted to a three-year period corresponding to the years under consideration for the funding amounts provided by the DFG and the federal government. In total, the institutions under consideration here have received €8,024.2 million under the Horizon 2020 programme to date. For further methodological explanations, see the Glossary of Methodological Terms at www.dfg.de/fundingatlas.

Note: Corresponds to Tabelle 3-1 of the DFG Förderatlas 2021.

Data basis and sources:
Deutsche Forschungsgemeinschaft (DFG, German Research Foundation): DFG awards for 2017 to 2019.
EU Office of the BMBF: Participation in Horizon 2020. EU Framework Programme for Research and Innovation (project data as of 12 May 2020).
Federal Ministry for Economic Affairs and Climate Action (BMWK): Funding for the Central Innovation Programme for SMEs (ZIM) 2017 to 2019.
Federal Ministry of Education and Research (BMBF): Direct R&D project funding from the federal government 2017 to 2019 (PROFI project database).
German Federation of Industrial Research Associations (AiF): Funding for Industrial Collective Research (IGF) 2017 to 2019.
Calculations by the DFG.

these other providers, thereby enabling cross-funding comparisons to be generated, as presented below.

Clear Differences among Research Funding Providers in terms of Institution-Specific Demand

Firstly, in a form familiar from the last Funding Atlas, Table 4-1 first shows the degree to which the various types of institution participate in the funding programmes offered by the DFG, the federal government and the EU. A distinction is drawn here between HEIs, non-university research institutions and industry/commerce. In the second of these categories, there is a differentiation between the non-university research organisations Fraunhofer-Gesellschaft (FhG), Helmholtz Association (HGF), Leibniz Association (WGL) and Max Planck Society (MPG), the federal research institutions and other institutions.

The distinctive profile of DFG funding is immediately apparent. It concentrates on research at HEIs, which have accounted for a stable share of around 89% for many years. The remainder goes to non-university institutions. Research projects based in companies are not funded by the DFG, but they do receive funding from the federal government and also from the EU. In each case, around 27% of the funding volume is invested in commercial research: in the case of the federal ministries, this was a good €3.1 billion over three years (2017 to 2019); under the EU's Horizon 2020 programme the amount was more than €1 billion, likewise over the three-year period.

With regard to federal government funding, Table 4-1 provides separate figures for Industrial Collective Research (IGF) pursued by the Federation of Industrial Research Associations (AiF).[3] In accordance with the programme's objectives, a large share of this funding is allocated to the 100 AiF member institutions; these are subsumed in the table under "Other institutions" in the non-university sector. In this sector, researchers at Fraunhofer-Gesellschaft institutes in particular appear as collaboration partners (also in receipt

3 See also at www.aif.de/en/members.

Table 4-2:
Number of AvH and ERC funding recipients by type of institution

Type of institution	AvH funding recipients		ERC funding recipients[1)]	
	N	%	N	%
Higher education institutions	**4,689**	**75.7**	**533**	**66.1**
Non-university research institutions	**1,507**	**24.3**	**273**	**33.9**
Fraunhofer-Gesellschaft (FhG)	28	0.5	1	0.1
Helmholtz Association (HGF)	245	4.0	74	9.2
Leibniz Association (WGL)	295	4.8	28	3.5
Max Planck Society (MPG)	722	11.7	141	17.5
Federal research institutions	65	1.0	3	0.4
Other research institutions	152	2.5	26	3.2
Overall	**6,196**	**100.0**	**806**	**100.0**

[1)] ERC funding recipients in Germany are shown.

Note: Corresponds to Tabelle 3-2 of the DFG Förderatlas 2021.

Data basis and sources:
Alexander von Humboldt Foundation (AvH): Research visits by AvH guest researchers from 2015 to 2019.
EU Office of the BMBF: ERC funding 2014 to 2019 in Horizon 2020. EU Framework Programme for Research and Innovation (project data as of 12 May 2020). Figures include Starting Grants, Advanced Grants and Consolidator Grants.
Calculations by the DFG.

Table 4-3:
ERC funding recipients[1)] 2014 to 2019 by type of institution and scientific discipline

Type of institution	Total	Humanities and social sciences	Life sciences	Natural sciences	Engineering sciences
	N	N	N	N	N
Higher education institutions	**533**	**99**	**160**	**137**	**137**
Non-university research institutions	**273**	**21**	**140**	**79**	**33**
Fraunhofer-Gesellschaft (FhG)	1				1
Helmholtz Association (HGF)	74		42	25	7
Leibniz Association (WGL)	28	2	8	10	8
Max Planck Society (MPG)	141	13	68	43	17
Federal research institutions	3	3			
Other research institutions	26	3	22	1	
Overall	**806**	**120**	**300**	**216**	**170**

[1)] ERC funding recipients in Germany are shown.

Note: Corresponds to Tabelle 3-3 of the DFG Förderatlas 2021.

Data basis and source:
EU Office of the BMBF: ERC funding 2014 to 2019 in Horizon 2020. EU Framework Programme for Research and Innovation (project data as of 12 May 2020). Figures include Starting Grants, Advanced Grants and Consolidator Grants.
Calculations by the DFG.

of funding). More than half of IGF funds are allocated to HEIs: as such, the latter can be seen to be strong partners under this programme, which is primarily geared towards industrial SMEs.

The amount of third-party funding awarded to different types of institution by the federal government, the EU and the AiF is shown in Tables Web-23 to Web-28 at www.dfg.de/fundingatlas, differentiated by individual HEIs and non-university research institutions.

Chapter 5 provides a detailed, institution-specific analysis of all the funding providers presented in Table 4-1, differentiated by scientific discipline. The AiF mainly provides funding in the field of the engineering sciences.

AvH and ERC Funding Recipients Predominantly Opt for Research Stays at HEIs

The Funding Atlas uses two key figures to evaluate the international attractiveness of institutions and their success in international competition to conduct top-level research. It refers firstly to the number of researchers who completed an extended research visit at a location with funds from the Alexander von Humboldt Foundation (AvH) and secondly to the number of persons who were awarded a Starting Grant, Consolidator Grant or Advanced Grant by the European Research Council (ERC). Three out of four AvH funding recipients also chose HEIs for their stay during the period 2015 to 2019: this remained very stable over time. Among non-university institutions, the institutes of the Max Planck Society were the most favoured destination for visiting researchers funded by the Alexander von Humboldt Foundation (see Table 4-2).

The distribution of ERC funding recipients has remained similarly stable over time.[4] Two out of three internationally renowned researchers in receipt of an ERC grant pursue their research project at an HEI. And in the case of AvH funding, the Max Planck Society attracts the second-highest number of ERC grantees. A good 17% of them choose a Max Planck Institute, while just under 10% opt for an institute of the Helmholtz Association.

Table 4-3 provides an additional separate breakdown of ERC participations differentiated according to the four scientific disciplines. This distribution is based on the subject orientation of the review panels. The overview clearly shows that ERC grantees at non-university research institutions have somewhat different subject emphases compared to those at HEIs: in the non-university sector, the majority of them (51%) conduct research in the life sciences. Although researchers in the life sciences form the largest group at HEIs, too, this group is closer in size (about 30%) to the other three scientific disciplines (the spectrum ranges from just under 19% in the humanities and social sciences to just under 26% in the two remaining scientific disciplines). The non-university focus on the life sciences is primarily at the expense of the humanities and social sciences, as well as the engineering sciences. Finally, Table 4-4 shows the HEIs preferred by ERC grantees. As in the last Funding Atlas, this table is headed by the universities **LMU Munich** and **TU Munich**.[5] **U Freiburg**, **FU Berlin** and **U Cologne** follow at some distance.

In total, ERC grantees were active at 61 HEIs in 2014 to 2019. Tables Web-27 and Web-29 at www.dfg.de/fundingatlas provide detailed breakdowns of AvH and ERC grantees by HEI.

Table 4-4:
The most frequently selected host universities by ERC-funded researchers 2014 to 2019

Higher education institution	Number of recipients[1]
	N
Munich LMU	59
Munich TU	49
Freiburg U	23
Berlin FU	21
Cologne U	20
Dresden TU	18
Göttingen U	17
Heidelberg U	17
Hamburg U	16
Tübingen U	16
Münster U	15
Berlin HU	14
Würzburg U	14
Aachen TH	13
Bochum U	13
Bonn U	13
Frankfurt/Main U	13
Ranked 1–14	**350**
Other HEIs[2]	**183**
HEIs overall	**533**
Based on: N HEIs	**61**

[1] ERC funding recipients in Germany are shown.
[2] Please see Table Web-27 at www.dfg.de/fundingatlas for data on other higher education institutions.

Note: Corresponds to Tabelle 3-4 of the DFG Förderatlas 2021.

Data basis and source:
EU Office of the BMBF: ERC funding 2014 to 2019 in Horizon 2020. EU Framework Programme for Research and Innovation (project data as of 12 May 2020). Figures include Starting Grants, Advanced Grants and Consolidator Grants.
Calculations by the DFG.

4 When comparing ERC case numbers, please note that this Funding Atlas covers a six-year reporting period whereas in the 2018 Funding Atlas the period under review was three years.

5 When comparing case numbers, it should be noted that the Funding Atlas 2018 is based on a shorter reporting period.

4.2 DFG Awards to Higher Education Institutions

Figure 4-1 shows the 40 HEIs in receipt of the highest DFG funding amounts differentiated by the 14 DFG research areas, supplemented by figures for the interdisciplinary Major Research Instrumentation, Scientific Library Services and Information Systems, and the expiring funding line Institutional Strategy under the Excellence Initiative run by the federal and state governments, as well as the university allowance under the federal and state governments' Excellence Strategy. The DFG Funding Atlas online supplement also shows all institutions that received more than €1 million in funding in the period under review – HEIs in Tables Web-7 to Web-12 and non-university research institutions in Table Web-19.

For the First Time, Both Two Munich Universities Lead the Table

Even though, as in previous editions, the overall ranking shows a very high degree of stability – the top ten include the same HEIs in eight out of ten cases, as was the case last time – there is nevertheless a remarkable change at the top. For the first time, the two Munich universities lead the ranking in the current Funding Atlas: **LMU Munich**, which is in first place as in 2018 and 2015, and **TU Munich**, which has climbed from 4th to 2nd place. One new addition to the group of the ten HEIs with the most DFG awards is **U Cologne**, which is now in 8th place, having climbed four places. **U Erlangen-Nürnberg** has also improved its ranking by one place and now ranks 10th. **HU Berlin** and **U Göttingen**, previously ranked 9th and 10th, are now in 11th and 12th place respectively. **TU Dresden** has also moved up to 5th place (previously 6th).

Number of HEIs Running DFG-Funded Projects Continues to Increase

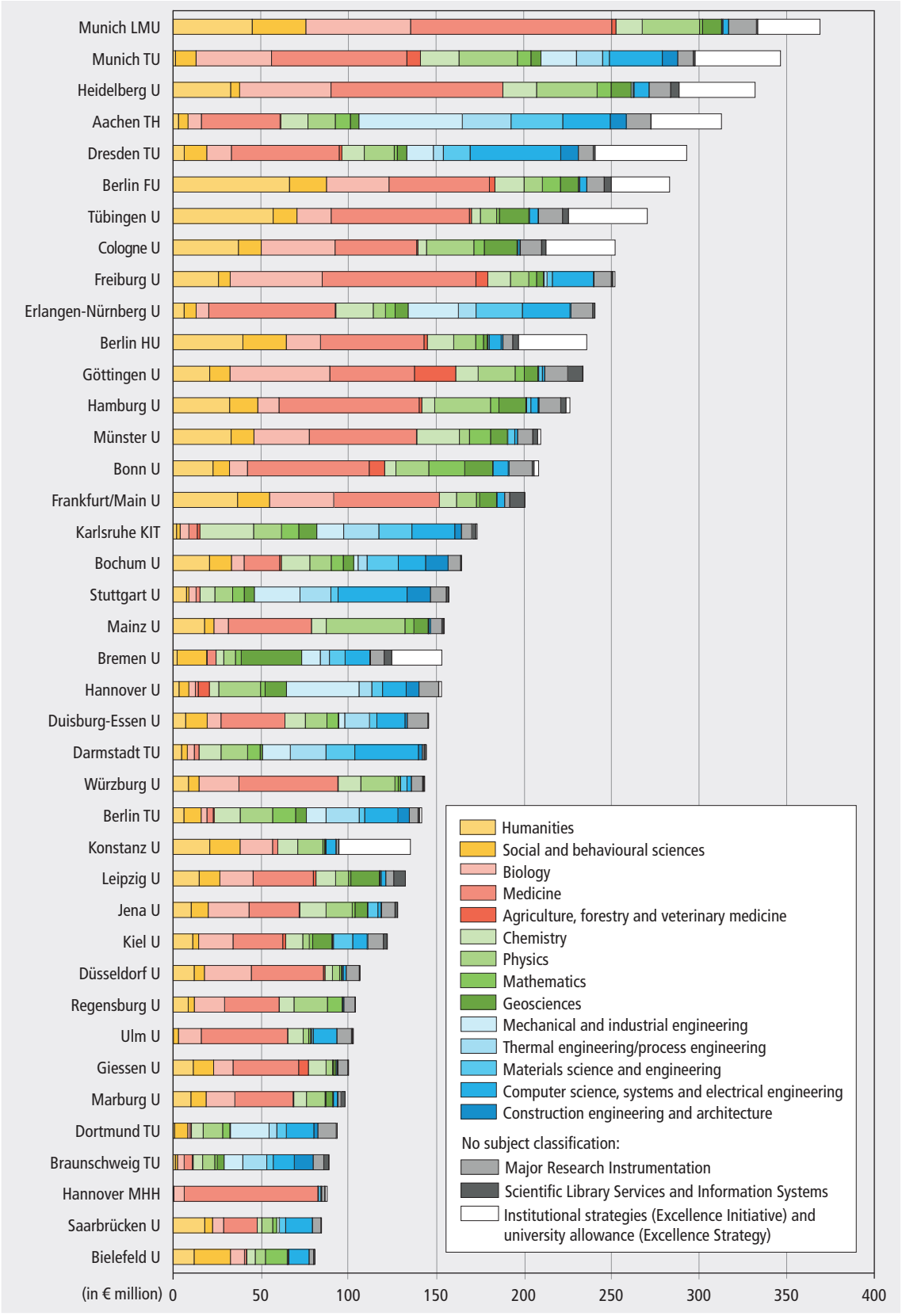
Researchers at all HEIs acquired total funding of around €8.4 billion for the period 2017 to 2019. DFG awards are documented for a total of 110 universities, 100 universities of applied sciences (FH/HAW) and 20 colleges of music and art. As such, the number of HEIs to have acquired DFG funds has increased further, from 216 to 225.

Rankings of HEIs Based on Scientific Disciplines

Table 4-5 shows which HEIs have received large amounts of DFG funding in the four scientific disciplines as defined by the DFG. This indicates that a high ranking overall does not necessarily involve a good ranking in one or more scientific discipline rankings. The humanities and social sciences, for example, are traditionally very active in acquiring DFG funding in Berlin (with **FU Berlin** and **HU Berlin** in 1st and 4th place), while other universities in the top five here include **LMU Munich**, **U Tübingen** and **U Frankfurt/Main**. In the life sciences, **U Heidelberg**, **U Freiburg** and **U Göttingen** are in the top five, alongside the two Munich universities. The ranking in the natural sciences is led by **U Heidelberg**, followed by the technical universities **TU Munich** and **KIT Karlsruhe**, along with **U Mainz** and **U Bonn**. Finally, the ranking sequence in the engineering sciences, which is traditionally led by **TH Aachen** – followed in the current ranking by **U Stuttgart**, **TU Dresden**, **U Erlangen-Nürnberg** and **TU Darmstadt** – shows a clearly different pattern.

Reference was made above to the fact that HEI rankings based on the volume of DFG third-party funding they acquire have remained very stable overall. This generally applies to rankings according to the four scientific disciplines, too. Nevertheless, there are certain "jumps" to be observed here somewhat more often. This is mainly due to the fact that the expiry or newly initiated funding of a single Collaborative Research Centre can have a significant impact on the DFG budget acquired, especially at smaller HEIs. More significant changes are to be seen in the humanities and social sciences, e.g. for **U Bochum** (from 20th to 11th place), **TU Berlin** (from 37th to 28th place), **U Lüneburg** (from 48th to 38th place), **U Halle-Wittenberg** (from 28th to 39th place) and **U Wuppertal** (from 51st to 40th place). The biggest climb – also mainly responsible for this university's climb to second place overall – was in the humanities and social sciences at **TU Munich**, which moved up 16 places from 50th to 34th. By comparison, the pattern in the life sciences appears quite stable. The most striking changes here are for **U Hamburg** (from 17th to 9th place) and **TH Aachen** (from 29th to 23rd place). In the natural sciences, significant upward and downward shifts in the rankings are

Figure 4-1:
DFG awards for 2017 to 2019 by higher education institution and research area[1)]



Note: Corresponds to Abbildung 3-2 of the DFG Förderatlas 2021.

[1)] Only the 40 leading recipients (higher education institutions) of DFG awards are presented here.

Data basis and source:
Deutsche Forschungsgemeinschaft (DFG, German Research Foundation): DFG awards for 2017 to 2019. Calculations by the DFG.

Table 4-5:
The higher education institutions with the highest DFG awards for 2017 to 2019 – overall and by scientific discipline

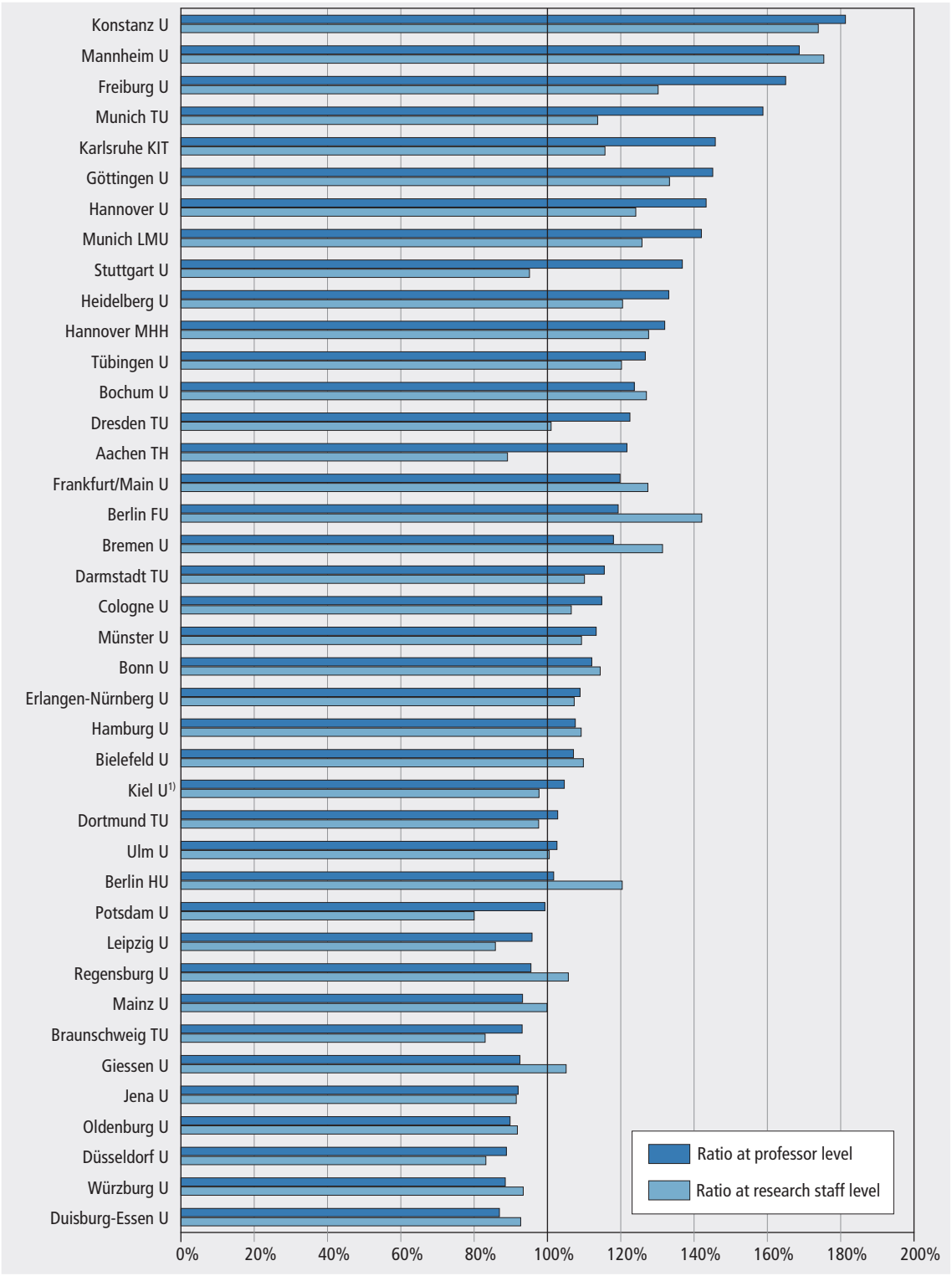
DFG awards[1]		Humanities and social sciences[2]		Life sciences[2]		Natural sciences[2]		Engineering sciences[2]	
Higher education institution	€m	**Higher education institution**	€m	**Higher education institution**	€m	**Higher education institution**	€m	**Higher education institution**	€m
Munich LMU	369.0	Berlin FU	87.5	Munich LMU	176.9	Heidelberg U	73.2	Aachen TH	152.5
Munich TU	346.5	Munich LMU	75.7	Heidelberg U	150.2	Munich TU	68.7	Stuttgart U	100.5
Heidelberg U	332.0	Tübingen U	70.6	Freiburg U	147.0	Karlsruhe KIT	66.6	Dresden TU	97.9
Aachen TH	312.8	Berlin HU	64.6	Göttingen U	128.8	Mainz U	66.6	Erlangen-Nürnberg U	92.9
Dresden TU	293.0	Frankfurt/Main U	55.0	Munich TU	128.0	Bonn U	61.6	Darmstadt TU	91.2
Berlin FU	283.2	Cologne U	50.3	Tübingen U	99.5	Munich LMU	60.2	Karlsruhe KIT	82.5
Tübingen U	270.5	Hamburg U	48.3	Frankfurt/Main U	97.0	Hamburg U	59.3	Munich TU	78.0
Cologne U	252.1	Münster U	46.1	Berlin FU	96.1	Cologne U	56.5	Hannover U	75.6
Freiburg U	252.0	Konstanz U	38.2	Hamburg U	93.6	Berlin TU	52.6	Berlin TU	58.7
Erlangen-Nürnberg U	240.6	Heidelberg U	37.9	Münster U	92.9	Münster U	51.7	Bochum U	53.8
Berlin HU	236.0	Bochum U	33.3	Cologne U	89.4	Bremen U	48.8	Braunschweig TU	50.8
Göttingen U	233.8	Bielefeld U	32.7	Bonn U	88.5	Berlin FU	47.6	Dortmund TU	49.9
Hamburg U	226.4	Freiburg U	32.6	Hannover MHH	82.1	Göttingen U	46.8	Bremen U	39.2
Münster U	209.7	Göttingen U	32.4	Berlin HU	80.5	Aachen TH	44.5	Duisburg-Essen U	39.0
Bonn U	208.5	Bonn U	32.2	Erlangen-Nürnberg U	79.7	Hannover U	44.0	Hamburg TU	29.7
Frankfurt/Main U	200.6	Mannheim U	32.1	Würzburg U	79.4	Bochum U	41.3	Freiberg TU	29.5
Karlsruhe KIT	173.4	Leipzig U	26.7	Dresden TU	77.1	Erlangen-Nürnberg U	41.2	Kaiserslautern TU	29.2
Bochum U	164.5	Mainz U	23.3	Düsseldorf U	68.8	Jena U	38.6	Freiburg U	28.8
Stuttgart U	157.3	Giessen U	23.1	Ulm U	62.3	Dresden TU	37.0	Chemnitz TU	28.2
Mainz U	154.7	Saarbrücken U	22.5	Mainz U	55.6	Darmstadt TU	36.2	Paderborn U	26.0
Bremen U	153.3	Potsdam U	20.4	Leipzig U	54.8	Leipzig U	36.2	Ilmenau TU	22.4
Hannover U	153.1	Jena U	20.0	Giessen U	54.0	Regensburg U	36.1	Kiel U	20.4
Duisburg-Essen U	145.7	Duisburg-Essen U	19.4	Aachen TH	52.9	Würzburg U	35.6	Saarbrücken U	20.3
Darmstadt TU	144.4	Dresden TU	19.2	Jena U	52.2	Berlin HU	34.2	Magdeburg U	16.4
Würzburg U	143.5	Bremen U	19.1	Marburg U	50.0	Tübingen U	32.7	Rostock U	15.6
Berlin TU	141.8	Marburg U	18.8	Kiel U	49.7	Frankfurt/Main U	32.5	Ulm U	15.0
Konstanz U	135.4	Düsseldorf U	17.8	Regensburg U	48.4	Freiburg U	31.7	Bayreuth U	13.2
Leipzig U	132.5	Berlin TU	16.0	Duisburg-Essen U	44.4	Stuttgart U	31.0	Siegen U	13.0
Jena U	128.1	Würzburg U	14.8	Lübeck U	41.9	Duisburg-Essen U	30.7	Clausthal TU	12.7
Kiel U	122.2	Kiel U	14.6	Halle-Wittenberg U	30.2	Bayreuth U	30.5	Bielefeld U	12.3
Düsseldorf U	106.5	Trier U	14.2	Bochum U	28.5	Konstanz U	27.2	Oldenburg U	11.7
Regensburg U	104.0	Siegen U	13.5	Saarbrücken U	25.5	Kiel U	26.4	Wuppertal U	10.7
Ulm U	102.8	Erlangen-Nürnberg U	13.1	Magdeburg U	22.9	Kaiserslautern TU	25.7	Kassel U	10.2
Giessen U	100.1	Munich TU	13.1	Oldenburg U	22.6	Potsdam U	23.9	Cottbus-Senftenberg TU	10.2
Marburg U	98.1	Bamberg U	12.6	Konstanz U	21.5	Bielefeld U	23.3	Heidelberg U	10.2
Dortmund TU	93.6	Regensburg U	12.1	Greifswald U	21.1	Marburg U	22.2	Bonn U	9.3
Braunschweig TU	88.9	Oldenburg U	11.1	Hohenheim U	15.4	Dortmund TU	22.2	Berlin HU	9.0
Hannover MHH	87.9	Lüneburg U	10.5	Potsdam U	14.6	Halle-Wittenberg U	20.1	Weimar U	8.5
Saarbrücken U	84.6	Halle-Wittenberg U	10.0	Hannover U	11.7	Braunschweig TU	17.6	Jena U	8.1
Bielefeld U	81.0	Wuppertal U	9.1	Osnabrück U	11.7	Giessen U	15.7	München UdBW	7.9
Ranked 1–40	**7,264.4**	**Ranked 1–40**	**1,164.1**	**Ranked 1–40**	**2,647.3**	**Ranked 1–40**	**1,598.6**	**Ranked 1–40**	**1,491.0**
Other HEIs[3]	**1,164.0**	**Other HEIs[3]**	**171.5**	**Other HEIs[3]**	**115.2**	**Other HEIs[3]**	**166.8**	**Other HEIs[3]**	**115.6**
HEIs overall	**8,428.5**	**HEIs overall**	**1,335.6**	**HEIs overall**	**2,762.4**	**HEIs overall**	**1,765.4**	**HEIs overall**	**1,606.7**
Based on: N HEIs	**225**	**Based on: N HEIs**	**161**	**Based on: N HEIs**	**103**	**Based on: N HEIs**	**100**	**Based on: N HEIs**	**141**

[1] Including university-wide awards in the 3rd funding line of the Excellence Initiative (institutional strategies) and Infrastructure Funding.
[2] Excluding awards in connection with the institutional strategies under the Excellence Initiative, the university allowance under the Excellence Strategy and Infrastructure Funding.
[3] Please see Tables Web-7, Web-8, Web-9, Web-10 and Web-11 at www.dfg.de/fundingatlas for data on other higher education institutions.

Note: Corresponds to Tabelle 3-5 of the DFG Förderatlas 2021.

Data basis and source:
Deutsche Forschungsgemeinschaft (DFG, German Research Foundation): DFG awards for 2017 to 2019.
Calculations by the DFG.

Figure 4-2:
Ratio of DFG awards for 2017 to 2019 to statistically expected values, adjusted for subject structure, of the 40 higher education institutions most active in terms of funding awards



[1] Including the University Medical Center Schleswig-Holstein.

Please see "Third-party funding adjusted for subject structure" in the Glossary of Methodological Terms at www.dfg.de/fundingatlas for more information.

Note: Corresponds to Abbildung 3-3 of the DFG Förderatlas 2021.

Data basis and sources:
Deutsche Forschungsgemeinschaft (DFG, German Research Foundation): DFG awards for 2017 to 2019.
Federal Statistical Office (Destatis): Education and Culture. Personnel at Higher Education Institutions 2018. Special analysis of Subject-Matter Series 11, Series 4.4.
Calculations by the DFG.

shown for **U Cologne** (from 16th to 8th place), **U Leipzig** (31st to 21st), **HU Berlin** (13th to 24th) and **U Duisburg-Esse**n (38th to 29th). Finally, in the engineering sciences, there are significant shifts to be noted for **TU Chemnitz** (from 12th to 19th place) and **U Bayreuth** and **U Wuppertal** (34th to 27th and 39th to 32nd, respectively).

The differences that emerge from Table 4-5 reflect the frequently very distinctive HEI subject profiles. The structure of chapter 5 takes these profiles into account by showing a breakdown of successful funding awards not only according to the four scientific disciplines but also in greater detail according to a total of 14 research areas. Finally, the tables provided in the DFG Funding Atlas web supplement show the subject priorities of HEIs and non-university research institutions, with a further breakdown of the figures into a total of 48 research fields (as well as the programme groups not classified by subject – see Tables Web-8 to Web-11).

DFG Awards to HEIs in Relative Terms

In the rankings presented so far, it is not least the size of the leading HEIs that accounts for their prominent status: where there are large numbers of teaching staff, there are more individuals who can be expected to be able to acquire third-party funding. But in addition to size, an HEI's subject profile is another key factor influencing the volume of funds acquired: where a lot of research is conducted in the DFG's biggest research area – medicine – and where there is an above-average number of costly projects – in the engineering sciences – it is easier to achieve a high ranking than at an HEI that focuses on the humanities and social sciences spectrum, for example. Since the 2015 edition, the DFG Funding Atlas has used a method that relates the funding amount that would be expected given the size and subject profile of an institution to the amount actually awarded, thereby controlling for both the aforementioned effects.[6] As in the last edition, all HEIs are included in the calculation that received more than €2 million in DFG funding in the course of the three-year period (in this case 2017 to 2019 – see Figure 4-2). A view based on the statistical expectation offers a different perspective on HEIs' ability to successfully attract third-party funding compared to the absolute figures.

The rank correlation coefficient of R = 0.51 shows how similar two ranking sequences are (at +1 the sequence would be identical, at -1 it would be exactly the opposite).[7] There is still a clear correlation between the absolute and relative rankings, but a look at the top ten already indicates some shifts. In relative terms (in relation to the number of professors), four out of the ten absolute leaders are in the top 10 (**TU Munich**, **LMU Munich**, **U Freiburg** and **U Heidelberg**) – these are four HEIs that can claim to lead the DFG third-party funding statistics in both absolute and relative terms. But as in 2018, the leading trio is made up of the universities **U Konstanz**, **U Mannheim** and **U Freiburg**. **KIT Karlsruhe**, **U Göttingen** and **U Hannover** also rank highly here. In total, 29 HEIs acquired more third-party funding than their size and subject profile based on the number of professors would have suggested. The expectation is exceeded by 81 percentage points at **U Konstanz**, which leads the relative ranking, by 33 percentage points at **U Heidelberg**, which is in 10th place, and by 14 percentage points at **U Cologne**, which is in 20th place.

4.3 Regional Research Profiles

As is familiar from previous editions of the DFG Funding Atlas, the description of the regional research profiles begins with an outline of the "DFG profiles", following a brief introduction on methodological issues. The focus is firstly on the funding instruments that are particularly in demand in each region, and secondly on the subject profiles of these regions. This is followed by a look at the regional priorities of direct project funding by the federal government and under the EU's Horizon 2020 framework programme, whereby the maps developed here are now only offered as interactive maps in the DFG Funding Atlas online supplement.

6 See Glossary of Methodological Terms under "Third-party funding adjusted for subject structure" at www.dfg.de/fundingatlas.

7 See Glossary of Methodological Terms under "Correlation coefficient" at www.dfg.de/fundingatlas.

Methodological Notes on the Regional Breakdown of Funding Data

Since the 2015 edition of the Funding Atlas, region-specific analyses in this reporting system have focused on the regional unit of so-called spatial development regions (ROR) – a standard developed by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR) (DFG, 2016: 41f.). This system distinguishes between a total of 96 regions, each of which (with the exception of the city-states) comprises a large-scale, functionally separate spatial unit. The names used in the Funding Atlas for RORs correspond to the nomenclature developed by the BBSR.[8]

Since 2005, the DFG has used a database that allows each of its funded projects to be classified based on its institutional origin, thereby allowing DFG funding activity to be analysed by region. The system is structured such that each institute, chair or other organisational unit of an HEI or non-university research institution is localised precisely based on its spatial coordinates.

In this way, the database also provides an underlying framework for the institutional and cartographic organisation of the data contributed by other funding sources to the DFG Funding Atlas.[9] This benefits both GERiT – the German Research Institutions database published online (www.gerit.org) – and the DFG project information system GEPRIS (www.dfg.de/gepris). In GERiT, for example, it is possible to display the spatial distribution of institutes in a particular research area at the click of a button. Taking the small subject of egyptology as an example, this is currently 20 institutes at twelve locations.

Regional Research Profiles in DFG Funding

In DFG funding, the regional perspective will primarily tend to show the HEIs located in a specific region: as Table 4-1 in chapter 4.1 clearly indicates, the majority of DFG funding is acquired by researchers working at HEIs. Figure 4-3 first differentiates the DFG funding volumes by region according to the instruments used to fund projects. This figure comprises data on projects with a total volume of around €9.5 billion for the period 2017 to 2019.

Berlin and München (Munich) immediately stand out as regions that attract a particularly large amount of DFG funding. Whereas in the 2018 Funding Atlas, researchers working in Berlin received a good €100 million more in funding than their colleagues in the Bavarian capital, the two cities are roughly on a par at the present time, with a difference of only €22 million. Other regions which are very active in terms of DFG funding include Unterer Neckar (Heidelberg and Mannheim), Aachen, Oberes Elbtal/Erzgebirge (around Dresden) and Hamburg, with sums ranging from just under €300 million to over €430 million.

As the map in Figure 4-3 further shows, DFG Individual Grants are the most significant factor shaping the research profile in almost all regions. An exception to this rule is the Hochrhein-Bodensee region (High Rhine-Lake Constance): here large amounts of funding were made available for **U Konstanz** in connection with the Institutional Strategies programme under the Excellence Initiative as well as university allowance under the Excellence Strategy.

Figure 4-4 shows the regional distribution broken down into the 14 research areas defined in the DFG subject classification system. This also shows the programmes not covered by the subject classification system, namely Major Research Instrumentation, Scientific Library Services and Information Systems and the Institutional Strategies under the Excellence Initiative, along with the university allowance under the federal government's and federal states' Excellence Strategy.

In the DFG subject classification system, the research areas of biology, medicine and agriculture, forestry and veterinary medicine together form the scientific discipline of the life sciences (shown together in red in the diagram, see also Table 5-1). At one third, this research area accounts for the largest share of the DFG funding volume in the period under review (see also Table 5-2). As in the last Funding Atlas, the map shows that in the regions of Donau-Iller (BW), Würzburg, Magdeburg, Vorpommern (with **U Greifswald**), Göttingen, Südlicher Oberrhein, Mittelhessen, Osnabrück and Düsseldorf, the research profile is heavily dominated by the life sciences,

8 See also the Glossary of Methodological Terms under "Regions" at www.dfg.de/fundingatlas.

9 See also the Glossary of Methodological Terms under "DFG Institution Database" at www.dfg.de/fundingatlas.

Figure 4-3:
Regional distribution of DFG awards for 2017 to 2019 by funding instrument

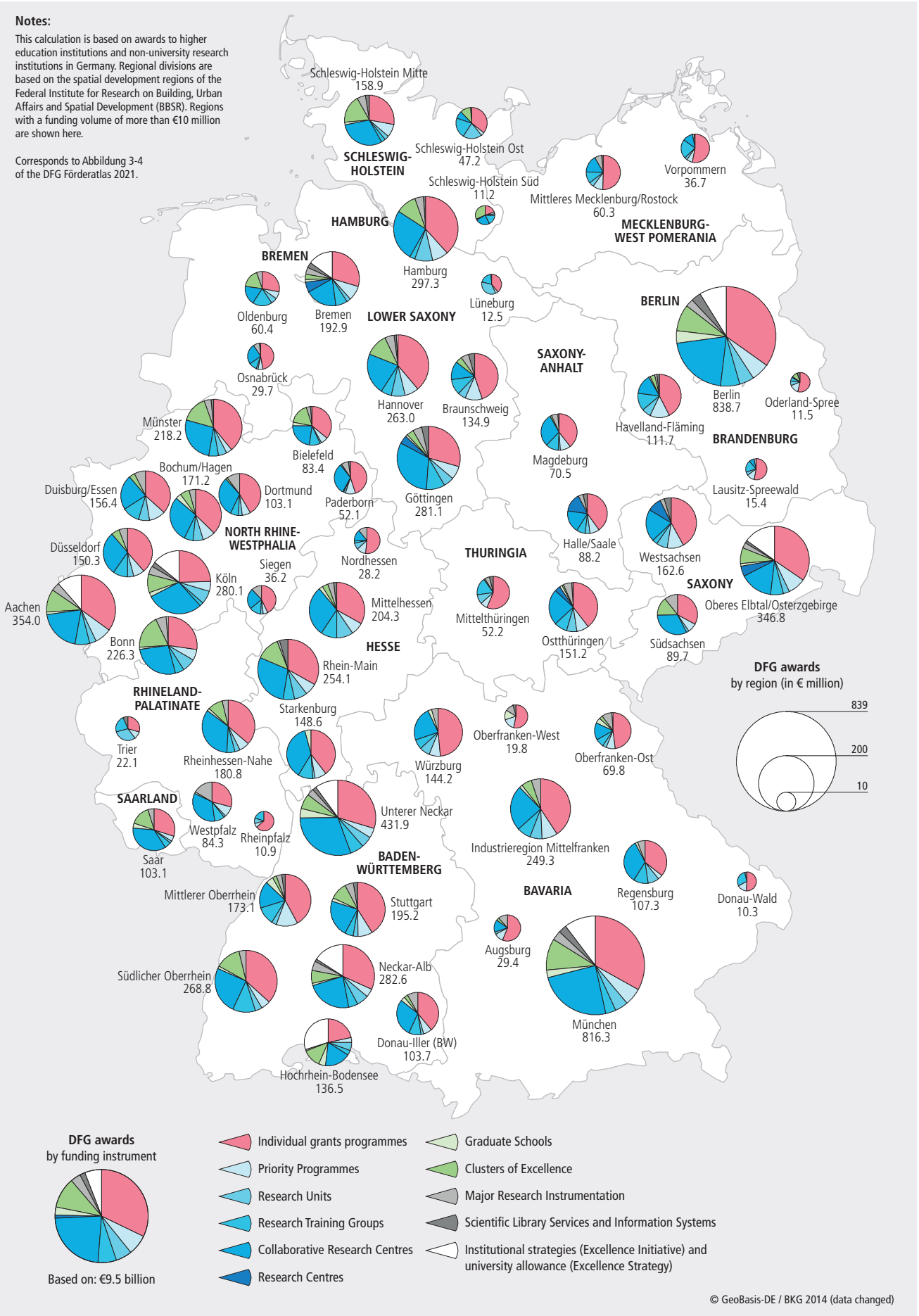
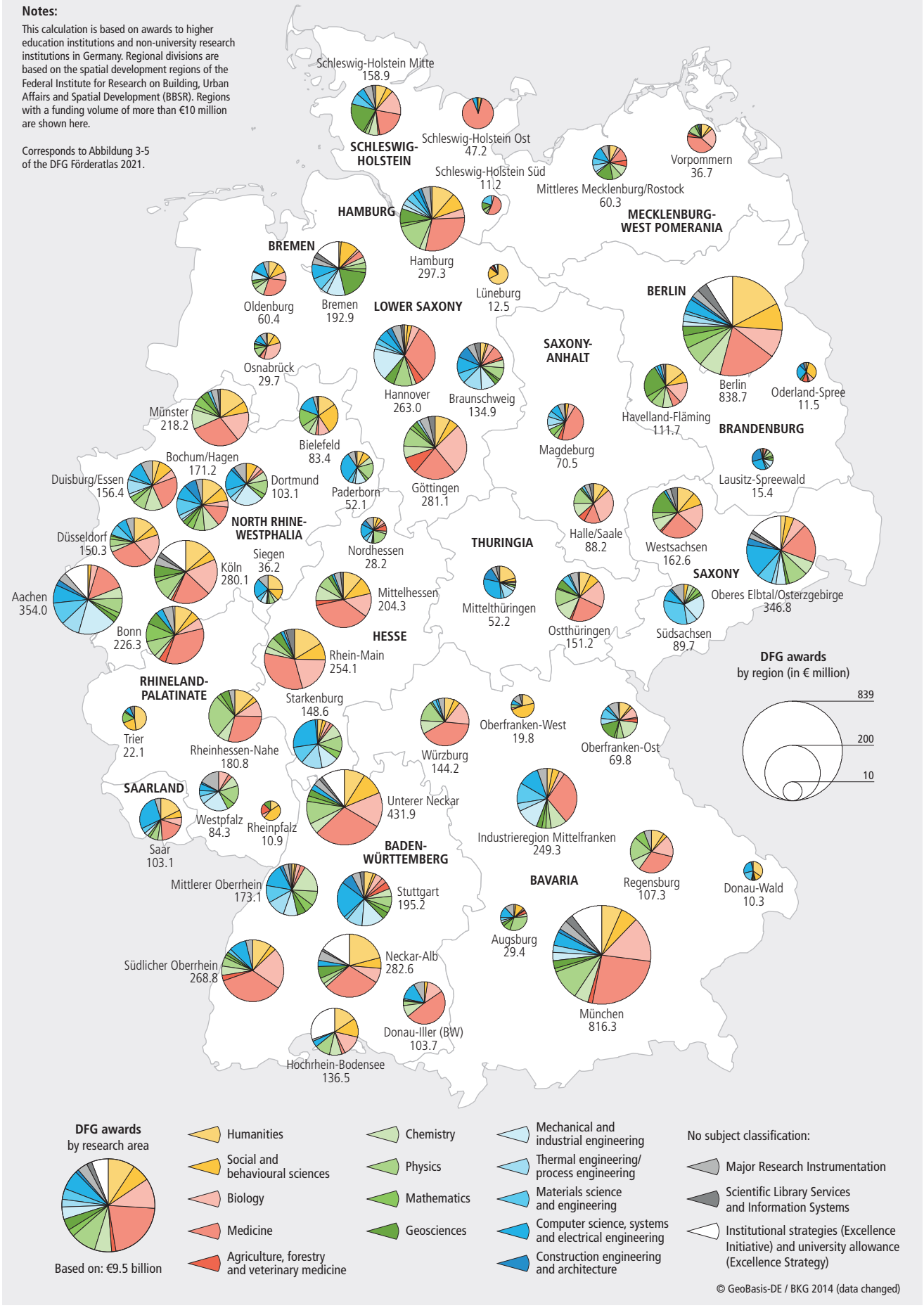


Figure 4-4:
Regional distribution of DFG awards for 2017 to 2019 by research area



and within this discipline mainly medicine. The East and South regions of Schleswig-Holstein, home to the **University Medical Center Schleswig-Holstein (UKSH)** operated jointly by the universities of Kiel and Lübeck, are likewise very much geared towards medical research.

While the latter regions have particularly large shares in the life sciences, it is the regions of Berlin, München and Unterer Neckar that are the leaders in this field of research, though the latter are well positioned in other research areas, too.

In both absolute and relative terms, Berlin's DFG profile shows it to be a powerful base for humanities and social sciences research. The more than €218 million awarded in both research areas is 26% of the total volume of DFG funding received by Berlin in the course of the reporting period.

Interactive Maps in the DFG Funding Atlas Online Supplement

In addition to the regional research profiles, the DFG Funding Atlas also compares the regional priorities of federal R&D funding and EU funding under the Horizon 2020 framework programme.

The respective funding amounts by subject or funding area and funding source can be selected and collated as desired for each federal state and region. As such, the interactive maps allow comparisons to be made between the regional priorities of federal R&D funding, EU funding under the Horizon 2020 framework programme and DFG funding (Figures 4-3 and 4-4 shown here) for specific research and funding areas. In all cases, the system of funding areas (federal government), programme sections (EU) and research areas/funding instruments (DFG) used by the respective funding source are taken as the basis for the detailed regional analysis.

In the case of the federal government, the interactive map is based on awards totalling €11.6 billion; in the case of the EU's Horizon 2020 programme, the figure is €4 billion.

In general, it can be said that the three funding profiles, the EU, the DFG and the federal government, show considerable stability in the long term. The maps do not capture specific moments in time but rather reflect a pattern of regional research and cooperation potential that can be seen to remain relatively stable over time.

4.4 Historical Research Funding 1921 to 1945

2020 was the 100th anniversary of the founding of the DFG's predecessor organisation, the *Notgemeinschaft der Deutschen Wissenschaft* ("Emergency Association of German Science") – a good reason for the present Funding Atlas to once again take a look at the early decades of the DFG's funding activity. This was possible due to the newly established (German-language) information system *GEPRIS Historisch* (https://gepris-historisch.dfg.de). In a similar way to the GEPRIS information system, which can be used to research currently funded and completed DFG projects in German and English, *GEPRIS Historisch* provides data on more than 50,000 proposals submitted by more than 13,000 male and (at that time still very few) female researchers applying to the DFG in the period from 1921 (i.e. the year following its founding) to 1945. The information system is based on DFG files and other relevant material accessible in the Federal Archives, such as index cards, annual reports and meeting documents. These archival records were indexed by Berlin historian Sören Flachowsky as part of his work with a DFG-funded research group on the history of the DFG (Wagner, 2021). The resulting collection of data was made available to the DFG Head Office, where it was further refined and enriched.

GEPRIS Historisch Links Information on DFG Funding to a Wide Range of Worldwide Data Sources Relating to Questions of the History of Science

The main aim here was to link the data – which tended to be fairly "slim" in itself, essentially comprising the applicant's last name, first name and town/city/institution as well as some information on the proposal (title, subject, type of grant, year, etc.) – with information from other data sources on the history of science. For this purpose, ID management was used, drawing on common identifiers to establish the link to these sources.[10] In this

10 Particularly worthy of mention are Wikipedia/Wikidata, the *Gemeinsame Normdatei* ("Integrated Authority File" – GND) and the directory of German personalities provided by the Bavarian Academy of Sciences and Humanities www.deutsche-biographie.de.

way, *GEPRIS Historisch* was integrated in a mutually linked information network that makes it possible to research information on the applicants of the period in more than 200 globally accessible reference systems. These include the *Deutsche Digitale Bibliothek* (German Digital Library), which primarily indexes publications by documented persons, and the professor catalogues and membership directories of certain institutions (universities, academies, etc.), as well as *Academic Tree*, a database documenting academic pedigrees of doctoral students. Finally, the collection also contains trivia and surprising finds, for example *Find a Grave*, a database of more than 190 million graves and memorials, and *Comic Vine*, a source which enables research into whether applicants ever appeared in a comic. Each of these sources provide a veritable treasure trove in which *GEPRIS Historisch* invites users to search for clues.

Funding for a Regionally Broad-Based Research Landscape

In total, the system identifies approximately 2,600 higher education institutions, non-university research institutions and other institutions where the funded researchers were working at the time they submitted their proposal.[11] In the context of the Funding Atlas, the data documented in *GEPRIS Historisch* are thus revealing in that they invite a comparison between the research landscape of the time and that of the present day: in which towns or cities and at what types of institution was research conducted with DFG funding between 1921 and 1945? What are the similarities to the situation today, what are the most striking differences?

The research landscape funded by the DFG between 1921 and 1945 was very diverse. One thing that can be concluded with certainty is that an applicant's institutional affiliation did not have the same role to play in the funding decision back then as it does today. Nevertheless, a comparison between the research landscape in modern-day Germany and that of 1921 to 1945 is difficult, not least because of the differences in terms of geographical reference points. Should areas of the German Reich that are now situated in Poland be taken into account when attempting such a comparison, for example? And if so, how? The present comparison limits itself to research institutions that were located on the territory of present-day Germany at the time. This accounts for some 84% of all proposal participations documented in *GEPRIS Historisch*.[12] The decision to take this approach takes into account the fact that the Funding Atlas ultimately seeks to shed light on the structure of today's German science system: in this context, the main question of interest is what similarities and differences can be identified in terms of regional participation in DFG funding.

About 84% of all proposal participations identified for *GEPRIS Historisch* came from towns or cities located in modern-day Germany. The share would be 91% if the regional limitation were extended to include the areas of the German Reich within the borders that applied up to 1937, including in particular the universities of Breslau and Königsberg (today: Wrocław and Kaliningrad), which were highly active in research. If one refers to the territory of the so-called Greater Germanic Reich, which was not internationally recognised and in the latter years of the war comprised territories or parts of territories now situated in modern-day Poland, the former Czechoslovakia, the Baltic states, Russia and, in the west, Alsace, Lorraine and Luxembourg, about 98% of all proposals came from regions within these "borders" or "administrative districts".[13]

The map in Figure 4-5 shows the proposal volume of the 46 most active locations with more than 50 participations in DFG proposal submissions at the time, differentiated by type of institution. These 46 locations account for a good 42,000 of the 45,000 proposals (approx. 94%) submitted from regions located in present-day Germany.[14] Another 600 or so towns and cities, each with less than 50 participations, are also shown as blue dots.

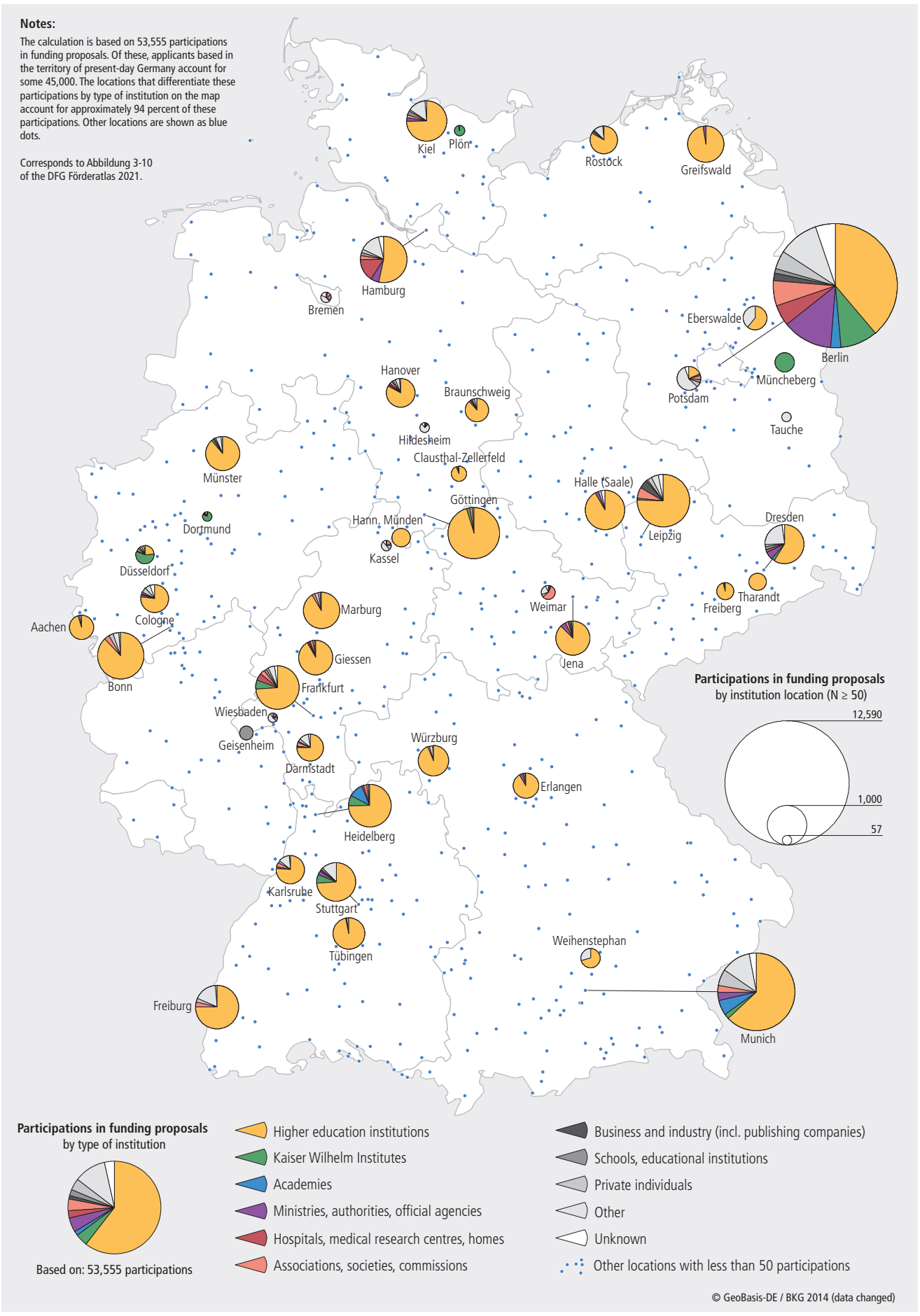
11 In addition, there are approximately 770 cases in which applicants approached the DFG as private individuals or without a known institutional affiliation but at a known location (e.g. 128 applicants designated as "private individual, Munich").

12 The approximately 45,000 proposal participations in this geographical area relate to some 42,000 proposal submissions.

13 The remaining 2% are distributed among about 1,000 proposal participations from no less than 58 different countries.

14 The count includes both awards (89% of all proposals) and rejections, as well as proposals whose decision status is not known.

Figure 4-5:
The main locations of DFG-funded research from 1921 to 1945 by type of institution



The Main Location of DFG-Funded Research from 1921 to 1945 was Berlin

Berlin was by far the most important location for DFG-funded research during this period. 12,590 proposal submissions are documented for the capital – also the seat of the DFG at the time – distributed among 533 institutions.[15] This is a share of 24% of all participations (including those located outside of present-day Germany). Berlin is followed at a considerable distance by Munich (with at least 3,900 proposal participations), Leipzig and Göttingen (with some 1,700 to 1,800 participations each) and Hamburg, Bonn, Frankfurt/Main, Freiburg, Heidelberg and Kiel (between 1,000 and 1,400 participations).[16]

The pie charts for the 46 towns and cities illustrate how the proposal volume was distributed among different types of institution. Higher education institutions account for the majority of proposals. At 60%, however, their share is significantly smaller than it is today, remaining quite stable over time at 88 – 90%. With regard to the towns and cities shown, there are clear differences in the participation of higher education institutions in DFG proposals. For Berlin as a research location, proposal submissions from higher education institutions typically account for a significantly below-average share of DFG proposals, at around 40%. In fact, all designated types of institutions are strongly represented here – from the Kaiser Wilhelm Institutes to academies, ministries, industry and commerce, and also private individuals. Göttingen (94%) and Bonn (87%) in particular had a profile that was strongly focused on university-based research. In Leipzig, Kiel, Freiburg, Heidelberg and Frankfurt/Main, too, about three out of four proposals (73–75%) came from higher education institutions. In Munich, the Bavarian Academy of Sciences and Humanities approached the DFG with a relatively large number of proposals. Finally, with a share of just under 16%, Hamburg shows a clear orientation towards research at hospitals and clinics.

Taking the regional distribution and comparing this with the situation today (not in terms of proposals submitted, but in terms of the volume of funding – in euros – acquired per spatial planning region, in this case: by town/city), initial differences emerge with regard to North Rhine-Westphalia, a present-day federal state located in the west of Germany (see Figure 4-4). Historically only Bonn was represented in the top ten, though Münster was still clearly visible as a research base. Cologne and Aachen, along with Düsseldorf and Dortmund – both with a focus on Kaiser Wilhelm Institutes – were much less active. The higher education landscape in North Rhine-Westphalia remained underdeveloped up until 1945; many of the higher education institutions that are now active in terms of DFG funding were not founded until the 1970s.

In Bavaria, in addition to the state capital as already mentioned, Erlangen and Würzburg were also actively engaged with the DFG as research bases, largely due to the higher education institutions located there. Meanwhile, Saarland and also Rhineland-Palatinate were largely "blank spots" on the research map of the years 1921 to 1945.[17] Similarities and differences can also be seen in the federal states in the eastern part of Germany. Among the 46 towns or cities with more than 50 proposal submissions, 15 (including Berlin) were located in eastern Germany between 1921 and 1945. At the time, Leipzig was the city with the third-highest number of proposal submissions overall, while Halle, Dresden, Greifswald, Jena and Rostock were also highly visible along with Eberswalde, where many proposals were submitted due to the university of forestry located there.

15 For almost 800 people, it was not possible to identify an institution, or they approached the DFG as private individuals.

16 Outside of today's borders, many DFG applicants were highly active in research in what was then Breslau (today Wrocław) (just under 1,600 proposal participations), Vienna (1,400 proposal participations) and Königsberg (today Kaliningrad – approximately 860 proposal participations). As far as the Austrian capital is concerned, it is interesting to note that the DFG received a large number of proposals from there as early as the 1920s.

17 This was primarily due to the unusual political situation, however: the so-called Saar Region was under French administration from 1920 onwards, joining the German Reich once again from March 1935 as a result of a referendum. Large parts of the federal state of Rhineland-Palatinate – which was not established in its current form until after the Second World War – also fell under Allied administration in the wake of the First World War; the so-called Occupation of the Rhineland ended on 30 June 1930.

DFG-Funded Research was Often Conducted in Small Towns and Rural Regions

The fact that DFG-funded research was not limited to large (university) cities at the time is exemplified by the towns of Geisenheim, Plön and Tauche which appear on the map. The Teaching and Research Institute for Viticulture, Fruit Growing and Horticulture was located in Geisenheim at the time; it initially continued to operate after the war as the Geisenheim Research Institute and formed part of the new Hochschule Geisenheim University from 2013 onwards. In Plön, researchers at the Kaiser Wilhelm Society's Hydrobiological Institute were actively engaged in the proposal submission process. And Tauche, specifically the district of Lindenberg, is where the Lindenberg Meteorological Observatory is situated: this remains active to this day, and *GEPRIS Historisch* shows evidence of just under 60 historical proposal participations.

In addition to the 46 towns and cities broken down in more detail, the map shows a total of 585 (shown as blue dots) from where an average of five proposals were submitted. Though some of these are hidden by the large pie symbols of those centres that were very actively engaged in DFG funding, the main message that comes across here is that there were large numbers of them. What is more, they were scattered relatively evenly over the territory of modern-day Germany. Whether Langenargen on Lake Constance with its Kaiser Wilhelm Institute for Lake Research and Lake Management, Großbeeren in the south of Berlin with its Experimental and Research Station for Horticulture – today's Leibniz Institute for Vegetable and Ornamental Crops – or Plauen in Saxony with a number of proposals submitted by various schools: DFG-funded research activity did not only take place in large university cities but also in a multitude of smaller towns and indeed often in rural areas.

Stability and Change in the Types of Institutions Involved in Proposal Submissions

The above analysis shows that the volume of proposals in the years 1921 to 1945 was distributed among large numbers of widely differing institutions and types of institution. By way of conclusion, we will now look at the question of whether and in what form these participations changed in the context of the sometimes very drastic political upheavals that occurred during the period under consideration. For this purpose, a distinction is drawn between three periods, with a particular focus on the phase from 1938 to 1945. In March 1937, the work of the DFG was largely transferred to the responsibility of the newly founded *Reichsforschungsrat* (RFR – Reich Research Council). This authority was to direct research towards the goals of the *Wehrmacht* (German Armed Forces) and the Four-Year Plan[18]. A *Kriegswirtschaftsstelle* ("War Management Office") set up at the DFG assigned urgency levels to researchers that indicated whether their research projects were considered particularly important, of limited importance or not important at all. As such, the phase from 1938 to 1945 was when the DFG's funding activities were largely determined by the RFR – and therefore the National Socialist regime – and ultimately the war. For purposes of comparison, the period 1921 to 1929 might be described as the "foundation and consolidation phase", while the period 1930 to 1937 can be termed the "transition phase" in which many principles that had previously been taken for granted (in particular: self-governance) were increasingly called into question and much was done to pave the way for subsequent control by the RFR.

The period from 1938 to 1945 saw major changes in the volume of proposals submitted. Even though the three periods themselves were of approximately the same length, namely eight to nine years each (see Table 4-6), the volume in this last period was significantly higher than that of the two preceding phases. This was mainly due to the fact that during these years of the National Socialist regime and war, significantly more extensive funds were made available than in the preceding phases. While the DFG was repeatedly hit by sometimes drastic cutbacks in the early 1930s, the clear orientation of the RFR towards research that was "essential to the war effort" later ensured a steady flow of funds. In the years in question, the regular budget ranged between 5 and 8 million marks – having previously been reduced from an initial 7 million (1930) to as low as 2.5 million marks (1936); but then a dedicated fund of over 50 million marks was set up in 1943,

18 https://en.wikipedia.org/wiki/Four_Year_Plan

opening up a whole new range of funding options. It was the instrument of the research contract – newly instigated at the end of 1937 – that came into play here, breaking with the bottom-up tradition of the DFG that had prevailed up until then by enabling the heads of the subject divisions now responsible for funding to define research tasks themselves and delegate them to suitable "contractors".[19]

Did this increase in funding and the focus on research related to the war effort also lead to a change in the institutional make-up of those submitting proposals? Table 4-6 provides an overview of how the share of the different types of institution developed over time.[20]

Higher Education Institutions were the Main Clientele Historically but Accounted for a Smaller Share Than Today

As mentioned in the opening remarks to this chapter, the majority of applicants were active at higher education institutions, with the latter's overall share in proposal participations amounting to about 60%. This share remained largely stable throughout all three phases, including from 1938 to 1945. After the higher education institutions, the Kaiser Wilhelm Society for the Advancement of Science (KWG) is the main source of proposals. The latter was founded in 1911 as a state umbrella organisation, though in part privately funded, with the aim of establishing and maintaining large-scale research institutions primarily in the natural sciences. With a share of just under 3% of all proposals, the Kaiser Wilhelm Institutes submitted comparatively few proposals in the first period under consideration here, but this share increased from just under 4% in the years 1930 to 1937 to just under 6% in the last phase. The increase was mainly due to the increase in the number of institutions over time: while only 35 KWG institutes were active in 1933, their number had grown to 47 by 1944 (Henning and Kazemi, 2016).[21] In addition to the increased number of KWG institutes, another factor which helped boost the volume of proposals submitted during the period under RFR control was certainly the fact that "almost all the KWG institutes [...] were directly relevant to the development of armaments in terms of their fundamental scientific orientation and their scientific potential" (Hachtmann, 2009: 37).

After the Second World War, most of the KWG institutes were transferred to the successor organisation which was newly founded in 1948, namely the Max Planck Society (MPG).[22]

With the Expulsion of Jewish Researchers, there was also a Change in the Composition of the DFG's Clientele

The stable share of proposals on the part of the higher education institutions and the strengthening of the KWG share (along with simultaneous absolute growth overall) indicate that the two types of institution forming the core of the research system at the time[23] at first appeared to overcome a very radical brain drain – namely the consequences of the "Law for the Restoration of the Professional Civil Service" passed in 1933. At the time, this law resulted in the mass expulsion of mainly Jewish academics, whom representatives of the Nazi regime did not wish to tolerate for political reasons. According to a study by Michael Grüttner and Sven Kinas, the expulsions affected about 19% of the teaching staff at German universities as of the winter semester of 1932/33 (Grüttner and Kinas, 2007: 147), including some well-known luminaries

19 On budget development, see also in *GEPRIS Historisch* under *Entwicklung des DFG-Budgets* ("Development of the DFG budget"); on RFR funding, see *Forschungsförderung der DFG im Nationalsozialismus* ("DFG research funding under National Socialism") (both in German).

20 Note that Table 4-6 also shows proposal participations originating from individuals and institutions engaged in research outside the modern-day borders of Germany at the time of submission.

21 Proposal submissions to the DFG are documented for 42 of the 50 KWG institutes that had since been established, plus the Berlin-based Administrative Headquarters, though some of the institutes were closed again during the period under consideration.

22 The MPG website provides a compact account of the historical development of the KWG and the MPG (https://www.mpg.de/195494/history-of-the-kaiser-wilhelm-society).

23 The academies should also be added to this core, even though they only submitted a small number of proposals to the DFG.

Table 4-6:
Participations in funding proposals by type of institution in the years 1921 to 1945

Type of institution	1921 to 1929		1930 to 1937		1938 to 1945		Overall	
	N	%	N	%	N	%	N	%
Higher education institutions	10,027	62.3	9,145	59.7	13,225	59.7	32,397	60.5
Kaiser Wilhelm Institutes	426	2.6	594	3.9	1,284	5.8	2,304	4.3
Academies	258	1.6	336	2.2	209	0.9	803	1.5
Ministries. authorities. official agencies	516	3.2	874	5.7	1,304	5.9	2,694	5.0
Hospitals. medical research centres. homes	369	2.3	417	2.7	600	2.7	1,386	2.6
Associations. societies. commissions	894	5.6	602	3.9	673	3.0	2,169	4.1
Business and industry (incl. publishing companies)	253	1.6	27	0.2	385	1.7	665	1.2
Schools. educational institutions	402	2.5	337	2.2	399	1.8	1,138	2.1
Private individuals	700	4.4	775	5.1	655	3.0	2,130	4.0
Other	1,449	9.0	1,702	11.1	2,815	12.7	5,966	11.1
Unknown	796	4.9	510	3.3	597	2.7	1,903	3.6
Overall	**16,090**	**100.0**	**15,319**	**100.0**	**22,146**	**100.0**	**53,555**	**100.0**

Note: Corresponds to Tabelle 3-8 of the DFG Förderatlas 2021.

Data basis and source:
Deutsche Forschungsgemeinschaft (DFG, German Research Foundation): GEPRIS Historisch. As of June 2021.
Calculations by the DFG.

in their respective field.[24] Similarly high figures can be assumed for the institutes of the KWG and the academies.[25] A source documenting the names of almost 1,900 expelled persons was used for *GEPRIS Historisch*: at least 500 of these individuals were active as DFG applicants. For applicants up to 1933, the source documents expulsion for 16% of those employed at a KWG institute, while the share for higher education institutions is 9%.[26]

In the late 1930s and during the war years, the RFR increasingly replaced these expelled persons with applicants whose research was probably not necessarily "excellent", but generally met a key criterion that had been assigned fresh importance – namely "relevance to the war effort".

What remains to be said about the other types of institution? The proportion of proposals submitted by applicants at academies declined in the third phase under consideration here, and funding also became less focussed on the work of commissions and societies that tended to deal with historical issues. And there was a shift in profile, too: politically and ideologically largely neutral associations such as the *Badische Historische Kommission* ("Baden Historical Commission") and the *Kommission für das Deutsche Rechtswörterbuch* ("Commission for the German Legal Dictionary") were now joined by associations such as the *Forschungsgemeinschaft Deutsches Ahnenerbe e.V.* ("Ancestral Heritage Research Association") under the leadership of Heinrich Himmler, Reichsführer SS, which used DFG funding to investigate prehistoric excavation sites and attempted to apply anthropological and historical research methods to find evidence to underpin the purported notion of an "Aryan master race".

Proposals submitted by persons working at ministries, authorities or administrative agencies were subject to similar changes. Over time, their share increased – from about 3% in 1921 to 1929 to just under 6% in 1938 to 1945 – as individuals who often submitted proposals to the DFG as a sideline activity in the early years were increasingly replaced with those intending to pursue "official" re-

24 Of a total of 43 Nobel Prize winners funded by the DFG between 1921 and 1945, eleven were victims of the expulsions.

25 Taking the example of the Institute for Physical Chemistry and Electrochemistry headed by Fritz Haber, a study by Kristie Macrakis suggests that the KWG institute was particularly open to Jewish academics, who were often denied access to a university teaching career even before the law was introduced (Macrakis, 1993: 54).

26 For further information on the subject of expulsion, see also the (German-language) section *Vertriebene Antragstellende: Die „List of Displaced German Scholars"* ("Expelled applicants: the list of displaced German scholars") in *GEPRIS Historisch*.

search. It was here that *Amt Rosenberg* achieved notoriety, for example: this was an official body for cultural policy and surveillance under the direction of Nazi ideologue Alfred Rosenberg, Hitler's commissioner responsible for the surveillance of all intellectual and ideological instructions and education in the NSDAP. More than 120 proposals to the DFG can be traced back to this institution, including the establishment of an image archive on customs and traditions, folk festivals, folk beliefs and traditional costumes etc. in Saxony, and studies on folk customs and the church in East Prussia. Here, too, as in the case of *Ahnenerbe* ("ancestral heritage"), the interest in ideological grounding clearly outweighed the interest in advancing scientific knowledge.

Above and beyond such "theoretically" questionable issues, research was also funded that can hardly be described as anything other than criminal, in particular in the field of medicine. One example here is the case of the geneticist Otmar von Verschuer, who worked at the University of Frankfurt/Main and at the Kaiser Wilhelm Institute for Anthropology, Human Heredity and Eugenics in Berlin. He placed himself extensively in the service of the National Socialist state and actively contributed to selection and murder. A reminder of Verschuer's crimes and the involvement of both the Kaiser Wilhelm Society and the DFG is provided by a memorial plaque at Verschuer's former institute in Berlin, while a memorial was also inaugurated in front of the DFG Head Office in September 2006.[27]

In the Third Phase, Industry and Commerce Gain Importance as Funding Recipients

It was not until the third phase that people from industry and commerce (including publishers) began to submit proposals to the DFG on a significant scale; they likewise benefited particularly from the new instrument of the research contract. The recipients of such orders included the corporation Interessengemeinschaft Farbenindustrie AG, or IG Farben for short[28], which was dissolved after the war and whose projects were primarily based in the RFR's Mineral Oil Research Division. The textile company J. P. Bemberg AG, based in Wuppertal, received several research contracts in the 1940s through the RFR's Fibre Research Division, mainly for the production of copper-based threads. The oil company Karpaten-Öl AG, founded as recently as 1942 with the purpose of exploiting oil deposits primarily located in the Ukraine and Poland for the German Reich, conducted petroleum geological studies which were financed by the RFR. And the Osram-Werke in Berlin solicited research contracts from the RFR's High-Frequency Research Division, which was primarily focused on armaments research (Flachowsky, 2005).

Private Scholars, Travelling Researchers and Part-Time Researchers Formed a Natural Part of the DFG Community

Small though it was, one group of scientists who contributed to shaping DFG proposal activity in the early years was that of private individuals: no less than 30 researchers approached the DFG with some 60 proposal submissions, explicitly noted in the sources as "private scholars". This frequently involved a request for a printing subsidy for publications, usually in the humanities. One example is the historian Friedrich Max Kircheisen, whose main work was the nine-volume biography *Napoleon I. – Sein Leben und seine Zeit*. But students of nature and local researchers also turned to the DFG, such as the Augsburg private scholar Heinz Fischer, who wanted to carry out a study on the grasshoppers of the Swabian Alpine foothills. So-called "travelling researchers" were another form of institutionally unaffiliated scientists. One example here is the self-taught scholar Leo Frobenius, who founded the so-called *Kulturkreis* theory in an essay on the origin of African cultures published in 1898. Finally, one grey area was that of researchers who were affiliated to an institution but conducted their research privately or as a sideline activity, i.e. without any direct connection to their official duties.

27 See also in *GEPRIS Historisch* the (German-language) section *Forschungsförderung der DFG im Nationalsozialismus* ("DFG research funding under National Socialism"), which also lists a selection of relevant publications on the topic.

28 IG Farben was also involved in the development of the pesticide Zyklon B, which was used for mass murder in the gas chambers of the Auschwitz-Birkenau extermination camp.

Several Proposals were also Submitted to the DFG by Schools and Other Educational Institutions

In this context, it is interesting to note that at least 1,100 proposals were submitted by persons who are documented as having worked as teachers at a grammar school, secondary school, theological seminary or other teaching institution. About half of these proposal participations relate to research in the humanities and (less frequently) the social sciences, in particular on philological subjects. As such, the most common type of grant awarded was a printing subsidy (about 30 %; the total share of printing subsidies was 17%). The school teachers include some women, to whom the path to an academic career in science was still largely closed at the time. One example is Eva Sachs, who received her doctorate in 1914 with a thesis on the Greek mathematician Theaetetus. Despite gaining a good grade for her doctoral thesis, she was not given a position at the university. She submitted her DFG proposals on archaic rhetoric while teaching at Cecilienschule in Berlin.

In general, the figures shown in the table indicate that private individuals and applicants based at institutions not primarily oriented towards research were more likely to have their proposed projects accepted during the DFG's founding and consolidation years. During the war years, little space was allocated to such "whimsical" activities.

5 Subject-Based Funding Profiles of Research Institutions

This main chapter of the DFG Funding Atlas looks at the subject-based profiles of HEIs and non-university research institutions in Germany based on the figures presented in chapter 2 and 3. The 20 institutions with the highest figures per indicator are taken into account. More comprehensive summaries in tabular form are to be found in the extensive online supplement to the Funding Atlas at www.dfg.de/fundingatlas, which includes all HEIs and non-university research institutions above indicator-specific thresholds.

First, this chapter addresses methodological issues, with a focus on the classifications used for subject areas and funding areas. The next chapter compares the funds awarded by the funding providers and funding recipients under consideration, differentiated according to the four DFG scientific disciplines: the humanities and social sciences, life sciences, natural sciences and engineering sciences.

From chapter 5.2 onwards, a detailed analysis is provided of the HEI profiles based on the traditional breakdown according to the four scientific disciplines. The printed version of the Funding Atlas no longer includes the distribution at the third level of the DFG subject classification – the so-called research fields, but tables with this information continue to be available in the online supplement to the Funding Atlas (see Tables Web-8 to Web-11 at www. dfg.de/fundingatlas).

5.1 Subject- and Content-Based Breakdown of the Various Funding Programmes Included in the Funding Atlas

The informativeness of statistics on research and its funding generally varies from one subject to another. In addition to the more marketing-related interest in ranking positions that focus on HEIs as a whole (see chapter 4.2), the relevant indicators are only useful for benchmarking purposes, for example, if they provide information about the subject profile of two comparable institutions in a sufficiently differentiated form. This makes it possible to distinguish such things as whether HEIs are more technically or non-technically oriented, whether they have a better track record in medicine, whether they are traditionally strong in acquiring third-party funding (because they have a well-staffed university hospital), or whether they ultimately focus more on humanities and social sciences or on STEM subjects.

The DFG works using two subject classification systems. The DFG's own system used to categorise incoming funding proposals is the one used most frequently, also in this Funding Atlas. In the version valid for this Funding Atlas, it distinguishes between a total of 213 subjects. These are hierarchically assigned to 48 research fields (corresponding to the subject specialism of the review board in each case), which in turn are broken down into 14 research areas and four scientific disciplines. Table 5-1 shows how these levels of the DFG subject classification system[1,2] are arranged. In the printed version of the Funding Atlas, the levels of the scientific disciplines are used in relation to DFG programmes. The online supplement also provides tables that facilitate sorting by funding volume in individual research fields – thereby enabling research field rankings to be compiled.

1 See also the Glossary of Methodological Terms under "DFG subject classification system" at www.dfg.de/fundingatlas.

2 In 2018 the DFG published a statistical report which in addition to showing the number of reviewers active each year as shown here also presents a range of other detailed information on the DFG's reviewer system (DFG, 2018b).

Table 5-1:
DFG system of review boards, research areas and scientific disciplines 2016 to 2019

Review board		Research area		Scientific discipline
101	Ancient cultures	Humanities	HUM	Humanities and social sciences
102	History			
103	Fine arts, music, theatre and media studies			
104	Linguistics			
105	Literary studies			
106	Social and cultural anthropology, non-European cultures, Jewish studies and religious studies			
107	Theology			
108	Philosophy			
109	Educational research	Social and behavioural sciences	SOC	
110	Psychology			
111	Social sciences			
112	Economics			
113	Jurisprudence			
201	Basic biological and medical research	Biology	BIO	Life sciences
202	Plant sciences			
203	Zoology			
204	Microbiology, virology and immunology	Medicine	MED	
205	Medicine			
206	Neurosciences			
207	Agriculture, forestry and veterinary medicine	Agriculture, forestry and veterinary medicine	AFV	
301	Molecular chemistry	Chemistry	CHE	Natural sciences
302	Chemical solid state and surface research			
303	Physical and theoretical chemistry			
304	Analytical chemistry, method development (chemistry)			
305	Biological chemistry and food chemistry			
306	Polymer research			
307	Condensed matter physics	Physics	PHY	
308	Optics, quantum optics and physics of atoms, molecules and plasmas			
309	Particles, nuclei and fields			
310	Statistical physics, soft matter, biological physics, nonlinear dynamics			
311	Astrophysics and astronomy			
312	Mathematics	Mathematics	MAT	
313	Atmospheric science, oceanography and climate research	Geosciences	GEO	
314	Geology and palaeontology			
315	Geophysics and geodesy			
316	Geochemistry, mineralogy and crystallography			
317	Geography			
318	Water research			
401	Production technology	Mechanical and industrial engineering	MIE	Engineering sciences
402	Mechanics and constructive mechanical engineering			
403	Process engineering, technical chemistry	Thermal engineering/ process engineering	TPE	
404	Heat energy technology, thermal machines, fluid mechanics			
405	Materials engineering	Materials science and engineering	MSE	
406	Materials science			
407	Systems engineering	Computer science, systems and electrical engineering	CSE	
408	Electrical engineering and information technology			
409	Computer science			
410	Construction engineering and architecture	Construction engineering and architecture	CEA	

Note: As of 2019. Table Web-50 at www.dfg.de/fundingatlas shows further differentiation by 213 subject areas.
Corresponds to Tabelle 4-1 of the DFG Förderatlas 2021.

Elected Members of the Review Boards Recommend DFG Awards

The very fine breakdown of DFG funding results from the review process, where the review board members elected according to specific subject specialisms have a key role to play. When processing proposals, these review boards have the task of evaluating the proposed projects comparatively and prioritising them depending on the budget available, primarily based on the reviews prepared for this purpose annually by approximately 15,000 reviewers, both in Germany and abroad. The final decision, which is usually based on the recommendations of the review board, is then reserved for the Joint Committee of the DFG.

Review board members are elected every four years by the scientific communities in Germany. What is more, the catalogue of subjects for which review board members are to be selected is itself regularly re-assessed. This Funding Atlas uses the subject classification for the reporting period 2017 to 2019 (see Table 5-1 and Table Web-50 at www.dfg.de/fundingatlas).

Subject Classification of University Institutes and Non-University Research Institutions as a Second Pillar of Subject-Specific Analyses

In addition to the subject classification system used by the DFG to classify the subject focus of a submitted funding proposal, the DFG uses the subject classification system of the Federal Statistical Office (Destatis)[3] to classify the organisational entity (institute of a higher education institution, department of a non-university institution, etc.) by which a proposal (or also a review) was submitted. This system distinguishes a total of 645 subjects. The analyses presented in the DFG Funding Atlas draw on the subject classification of applicants' institutes, especially under the Excellence Initiative, which is usually very broad in terms of subject matter, and the Excellence Strategy[4].

Excerpts from the DFG's database of institutes are published online as GERiT – German Research Institutions (see Figure 2-5). The information system is bilingual and is particularly useful for early-career academics from other countries interested in a research stay in Germany, since it enables them to find out more about the research centres listed in the system.

Funding Measures Offered by Other Funding Bodies are also Analysed in Detail, Either in Terms of their Subject (DAAD and AvH) or their Fields of Application (Federal Government and EU)

The other funding providers considered in the Funding Atlas also generally use subject-oriented or topic-oriented systems in their proposal processing so as to enable the incoming proposal volume to be statistically analysed. For the first time, a concordance has been used in this Funding Atlas for the classification systems used by the AvH and DAAD which "translates" their subjects to the second level of the DFG system, i.e. to a total of 14 research areas (previously they were only allocated to the four scientific disciplines). This offers new options for comparison based on differentiated subjects. The federal government and the EU do not use subject classifications: instead they focus on fields of application, which are referred to as funding areas (17 units, in turn subdivided into 51 funding priorities) at the federal level, and as programme sections (23 units) at the EU level. As familiar from previous editions of the Funding Atlas, it was possible to allocate these units approximately to the DFG's four scientific disciplines, so at this level at least the priorities can be compared with those of the other funding providers. This lack of a precise definition at the federal level applies even more to the programmes of the EU. As a rule, these do not have a subject classification at all and are therefore assigned to a scientific discipline as a whole. As was first done in the DFG Funding Atlas 2018 (DFG, 2019: 56), the European Research Council (ERC) programme and the Marie Skłodowska-Curie Actions are once again differentiated by scientific discipline here. This is possible based on access to details of the specialised subject panels in which the funding decisions were prepared.[5]

3 See also the Glossary of Methodological Terms under "Destatis subject classification system" at www.dfg.de/fundingatlas.

4 See also the Glossary of Methodological Terms under "Excellence Initiative/Excellence Strategy" at www.dfg.de/fundingatlas.

5 See also the Glossary of Methodological Terms under "EU funding" at www.dfg.de/fundingatlas.

Table 5-2:
Participation[1] in DFG, federal government and EU funding programmes for research by scientific discipline

Scientific discipline	DFG awards		Direct R&D project funding from the federal government		R&D funding in Horizon 2020[2]	
	€m	%	€m	%	€m	%
Humanities and social sciences	1,465.2	15.4	449.6	3.9	187.0	4.7
Life sciences	3,174.4	33.5	1,981.8	17.1	853.8	21.3
Natural sciences	2,034.7	21.5	1,909.8	16.5	454.4	11.3
Engineering sciences	1,770.9	18.7	5,540.1	47.7	1,822.7	45.4
No subject classification	1,038.4	10.9	1,724.5	14.9	694.2	17.3
Overall	**9,483.7**	**100.0**	**11,605.9**	**100.0**	**4,012.1**	**100.0**

[1] Funding for German and institutional recipients only.
[2] For comparison purposes, the funding amounts for Horizon 2020 shown here have been converted to a three-year period corresponding to the years under consideration for the funding amounts provided by the DFG and the federal government. In total, the institutions under consideration here have received €8,024.2 million under the Horizon 2020 programme to date. For further methodological explanations, see the Glossary of Methodological Terms at www.dfg.de/fundingatlas.

Note: Corresponds to Tabelle 4-2 of the DFG Förderatlas 2021.

Data basis and sources:
Deutsche Forschungsgemeinschaft (DFG, German Research Foundation): DFG awards for 2017 to 2019.
EU Office of the BMBF: Participation in Horizon 2020. EU Framework Programme for Research and Innovation (project data as of 12 May 2020).
Federal Ministry for Economic Affairs and Climate Action (BMWK): Funding for the Central Innovation Programme for SMEs (ZIM) 2017 to 2019.
Federal Ministry of Education and Research (BMBF): Direct R&D project funding from the federal government 2017 to 2019 (PROFI project database).
Calculations by the DFG.

Table 5-3:
Number of AvH, DAAD and ERC funding recipients by scientific discipline

Scientific discipline	AvH funding recipients		DAAD funding recipients		ERC funding recipients[1]	
	N	%	N	%	N	%
Humanities and social sciences	1,873	30.2	1,625	44.1	120	14.9
Life sciences	1,059	17.1	530	16.1	300	37.2
Natural sciences	2,474	39.9	854	23.5	216	26.8
Engineering sciences	790	12.8	553	14.4	170	21.1
Overall[2]	**6,196**	**100.0**	**3,724**	**100.0**	**806**	**100.0**

[1] ERC funding recipients in Germany are shown.
[2] Including DAAD funding recipients without specification of the scientific discipline.

Note: Corresponds to Tabelle 4-3 of the DFG Förderatlas 2021.

Data basis and sources:
Alexander von Humboldt Foundation (AvH): Research visits by AvH guest researchers from 2015 to 2019.
EU Office of the BMBF: ERC funding 2014 to 2019 in Horizon 2020. EU Framework Programme for Research and Innovation (project data as of 12 May 2020).
Figures include Starting Grants, Advanced Grants and Consolidator Grants.
German Academic Exchange Service (DAAD): Research visits by DAAD guest researchers 2015 to 2019.
Calculations by the DFG.

Specific Subject Highlights among Research Funders

The research funders considered in the Funding Atlas each have their own specific focus areas. Table 5-2 shows this for EU, federal government and DFG funding, while Table 5-3 indicates the pattern for individual funding under the AvH, DAAD and ERC programmes, initially in a highly aggregated comparison between the shares of the four scientific disciplines. Starting with a comparison of EU and federal government funding (see Table 5-2), there is initially a great similarity. In both cases, the engineering sciences showshares of over 45%. The life sciences and natural sciences are also similar, the natural sciences being somewhat weaker in EU funding and the life sciences somewhat stronger. For both funding sources, the humanities and social sciences account for just a small proportion of awarded funding.

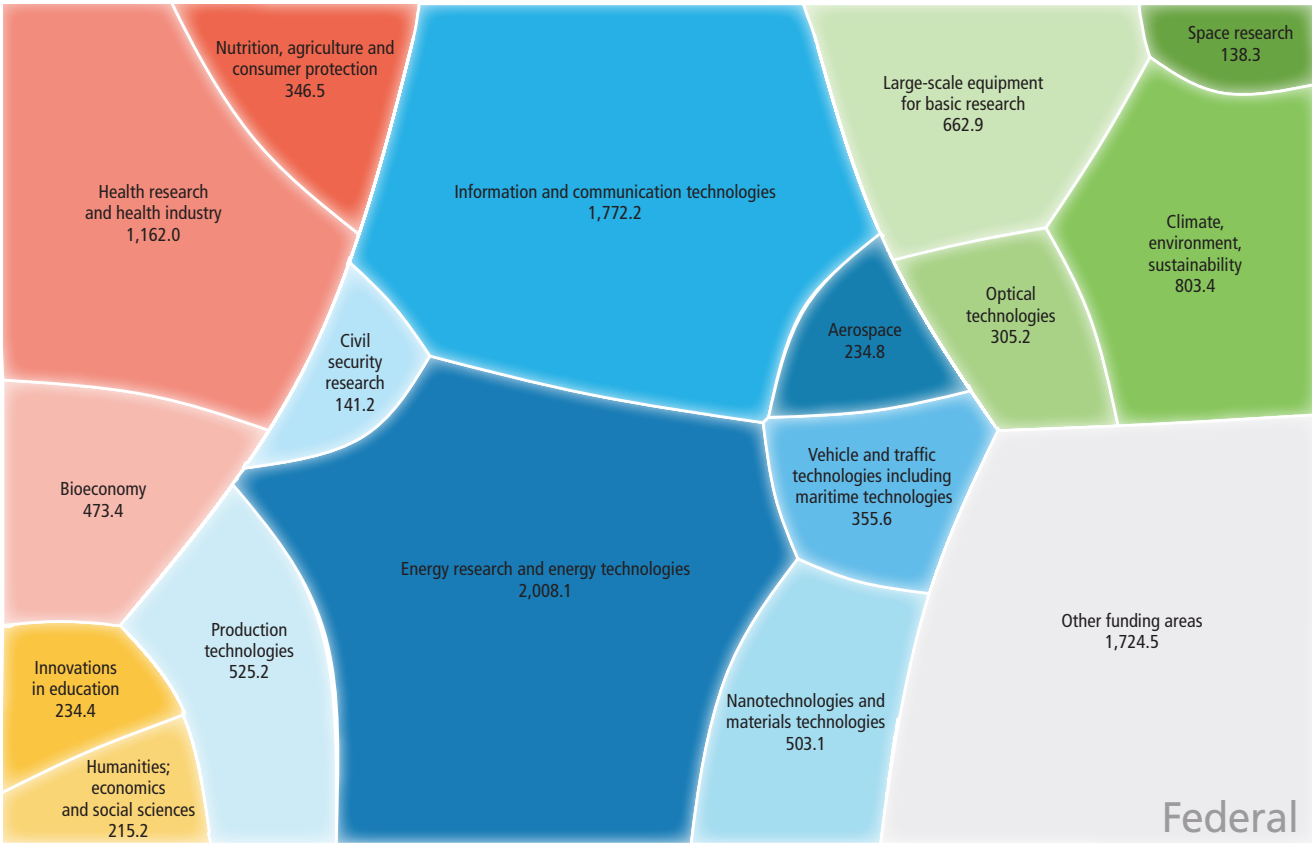
DFG awards follow a very different pattern of distribution. Here, the life sciences are strongly represented, although they do not achieve the same dominance as the engineer-

Figure 5-1:
DFG awards by research area and funding in Horizon 2020 by programme section

Note: Areas are proportionate to funding distribution. Figures are in millions of euros. Funding from the European Research Council (ERC) and Marie Skłodowska-Curie Actions (MSCA) are assigned to scientific disciplines in accordance with the subject orientation of the evaluating panel. Corresponds to Abbildung 4-1 of the DFG Förderatlas 2021.

Data basis and sources:
Deutsche Forschungsgemeinschaft (DFG, German Research Foundation): DFG awards for 2017 to 2019.
EU Office of the BMBF: Participation in Horizon 2020. EU Framework Programme for Research and Innovation (project data as of 12 May 2020).

Figure 5-2:
R&D project funding from the federal government 2017 to 2019 by funding area



Note: Areas are proportionate to funding distribution. Figures are in millions of euros. Corresponds to Abbildung 4-2 of the DFG Förderatlas 2021.

Data basis and sources:
Federal Ministry for Economic Affairs and Climate Action (BMWK): Funding for the Central Innovation Programme for SMEs (ZIM) 2017 to 2019.
Federal Ministry of Education and Research (BMBF): Direct R&D project funding from the federal government 2017 to 2019 (PROFI project database).
Calculations by the DFG.

ing sciences with the EU and the federal government. Likewise, the natural sciences are relatively well represented, though the humanities and social sciences also achieve a share of over 15%.

They are thus significantly more involved in DFG funding than they are with the federal government and the EU. By contrast, the share of engineering sciences in terms of DFG funding is significantly lower here.

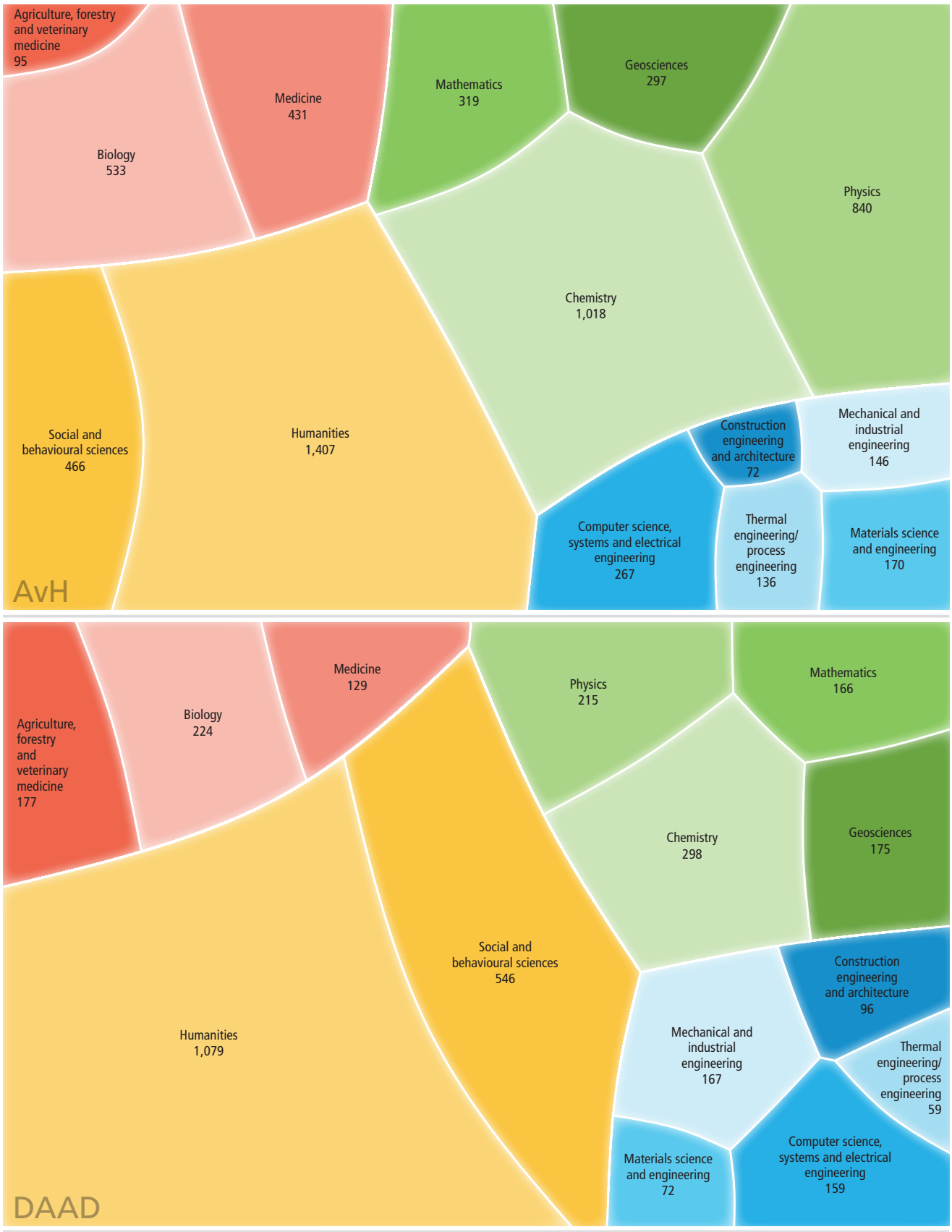
The DFG profile is very similar to that of the ERC: the fact that the ERC and DFG share similar scientific disciplines – given that both are strongly oriented towards the bottom-up principle – suggests that the distribution pattern shown in the tables is largely representative of the general need for third-party funding in the underlying subjects.

The DAAD and the AvH, which are listed in Table 5-3 below, in turn set their own priorities. A strikingly high number of guests in the humanities and social sciences (44%) benefit from DAAD funding, while the AvH focuses more on the natural sciences (40%).

As familiar from the DFG Funding Atlas 2018 (DFG, 2019: 57ff.), Figures 5-1 and 5-2 provide a graphic breakdown of the shares of the different research areas (DFG), funding areas (federal government) and funding programmes (EU) for the three funding sources. The areas shown in the Voronoi diagrams result proportionally from a field's share of the total funding volume in millions of euros. Clusters in similar colours bring together different units according to their categorisation in the four disciplines of the DFG classification system. The shares of funding instruments without a subject classification are also shown, in shades of grey.

The two Voronoi graphs for the AvH and the DAAD (see Figure 5-3) are a new addition as compared to the last edition of the Funding Atlas. These breakdowns were enabled, as described in the introduction to this chapter, based on the matching of the highly differentiated subject classifications used by the two funding sources, mainly for internal purposes, with the DFG's subject classification system.

Figure 5-3:
AvH and DAAD funding recipients from 2017 to 2019 by research area



Note: Areas are proportionate to funding distribution. Figures are in millions of euros. Corresponds to Abbildung 4-3 of the DFG Förderatlas 2021.

Data basis and sources:
Alexander von Humboldt Foundation (AvH): Research visits by AvH guest researchers from 2015 to 2019.
German Academic Exchange Service (DAAD): Research visits by DAAD guest researchers and graduates 2015 to 2019.
Calculations by DFG.

This now enables direct comparisons to be made with the portfolios of the other funders. Please note that the areas of the individual AvH and DAAD units are derived from the number of persons funded, while for the other funding sources they reflect the respective funding volumes provided.

If we first compare the figures for the DFG, the federal government and the EU, it emerges that there is a focus of EU and federal government funding on the engineering sciences, as already established above. Within the dominant engineering sciences, it is the projects in the area of energy research and energy technologies as well as information and communication technologies that set clearly visible priorities at the federal level. The latter are also a focus for the EU, combined with the application area of 'Secure, clean and efficient energy supply'. What is more, the largest share of EU funding in the humanities and social sciences is clearly accounted for by ERC funding and the Marie Skłodowska-Curie Actions.

Table 5-3 already shows the relatively high degree of similarity between the subject profiles of the AvH and the DAAD at the level of the four scientific disciplines. The life sciences and the engineering sciences are roughly equal in size; for the AvH, the natural sciences have a slightly greater weight, while for the DAAD, this applies to the humanities and social sciences.

In the Voronoi diagrams presented for the first time in this Funding Atlas, it is now possible to see further internal differentiations. For example, the AvH is a frequently chosen funder of visiting stays in the natural sciences, especially in the case of chemists from other countries.

Subject-Based Profiles of Selected HEIs in the Online Supplement

Complementing the data presented in the print version of the Funding Atlas, the accompanying online material at www.dfg.de/fundingatlas includes institution-specific Voronoi diagrams for a selection of over 80 HEIs in the 'HEI views'. This enables HEIs to compare their own profile with that of the DFG overall, for example, so as to be able to view internal subject highlights in the light of an overall average. The material can also be used to compare the profiles of two institutions.

5.2 Funding Profiles in the Humanities and Social Sciences

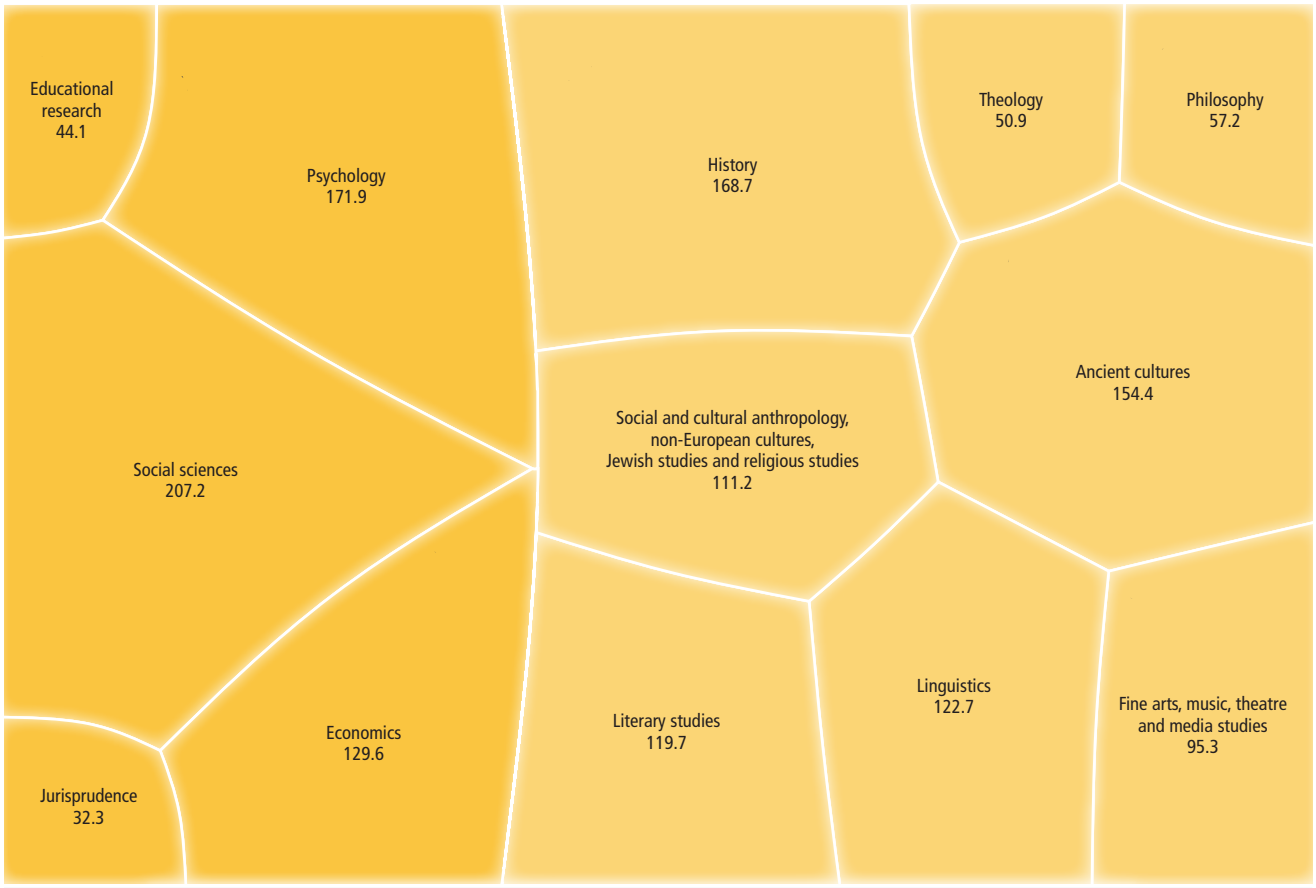
The humanities and social sciences are the discipline with the largest number of staff at German HEIs. Around 45% of professors at universities work in this scientific discipline (see Table Web-33 at www.dfg.de/fundingatlas). The humanities and social sciences have accounted for a stable proportion of between 15% and 16% of DFG funding for many years. Figure 5-4 shows how the sums awarded are distributed among the DFG's differentiated research areas and research fields.

The spatially proportional Voronoi diagram shows the distribution of DFG funding amounts from 2017 to 2019 based on the 13 research fields, corresponding to the DFG research areas of the humanities in the lighter shade of yellow and the social and behavioural sciences in the darker shade of yellow (see Table 5-1). The humanities account for about 60% of the total sum for this scientific discipline, namely €880 million. In the social and behavioural sciences, a total sum of €585 million was awarded in the period under review. This means that both research areas were able to increase their funding totals by about 14% compared to the last Funding Atlas, also in proportion to the overall DFG funding totals. The funding amounts for the individual research fields range in size from a good €32 million for law to over €200 million for the largest research field, the social sciences. Detailed analyses of DFG funding profiles for HEIs and non-university research institutions by individual research areas and research fields as distinguished in the Voronoi diagram above are to be found in the form of tables at www.dfg.de/fundingatlas (Tables Web-8 and Web 19).

The DFG is the Largest Third-Party Funder in the Humanities and Social Sciences

Compared to the EU and the federal government, the DFG is the largest provider of third-party funding in the humanities and social sciences (see Table 5-4). In the non-university sector, institutes of the Leibniz Association (WGL) are particularly actively engaged with the DFG, as are many museums and libraries.

Figure 5-4:
DFG awards for 2017 to 2019 by research field in the humanities and social sciences



Note: Areas are proportionate to funding distribution. Figures are in millions of euros. Corresponds to Abbildung 4-4 of the DFG Förderatlas 2021.

Data basis and source:
Deutsche Forschungsgemeinschaft (DFG, German Research Foundation): DFG awards for 2017 to 2019.
Calculations by the DFG.

The funds acquired from the federal government specifically for third-party funding projects in the humanities and social sciences amount to €450 million for 2017 to 2019. This is broadly in line with the volume reported in the 2018 Funding Atlas for the period 2014 to 2016. Compared to the other three scientific disciplines, HEIs account for a significantly larger share of the volume (77%). Humanities and the social sciences in Germany benefit from EU funding to a lesser extent, and the majority of this funding comes from the ERC (see Table 5-3 and Table 5-4).

Overviews of the total number of HEIs and non-university research institutions in the humanities and social sciences that receive funding from the DFG, the federal government and the EU are to be found in Tables Web-8, Web-15, Web-19, Web-23, Web-24, Web-26 and Web-28 at www.dfg.de/fundingatlas.

Structure-Building Effect of the DFG's Coordinated Programmes

One aim of the structure-building funding instruments offered by the DFG and the Excellence Initiative, as well as the Excellence Strategy which builds on the latter, is not least to support cooperation between individual researchers at different institutions. The cartographic network diagrams in the Funding Atlas illustrate this cooperation based on joint participations in relevant research consortia. The funding instruments included here are the federal government's and federal states' Graduate Schools (Excellence Initiative), Clusters of Excellence (Excellence Initiative and Excellence Strategy) along with the DFG programmes Research Centres, Collaborative Research Centres, Research Training Groups and

Table 5-4:
Participation[1] in DFG, federal government and EU funding programmes for research by type of institution in the humanities and social sciences

Type of institution	DFG awards		Direct R&D project funding from the federal government		R&D funding in Horizon 2020[2]	
	€m	%	€m	%	€m	%
Higher education institutions	**1,335.6**	**91.2**	**347.5**	**77.3**	**136.3**	**72.9**
Non-university research institutions	**129.5**	**8.8**	**95.7**	**21.3**	**46.3**	**24.7**
Fraunhofer-Gesellschaft (FhG)	0.0	0.0	2.3	0.5	2.8	1.5
Helmholtz Association (HGF)	0.4	0.0	0.2	0.0	4.0	2.2
Leibniz Association (WGL)	57.3	3.9	36.8	8.2	7.8	4.2
Max Planck Society (MPG)	7.9	0.5	2.6	0.6	12.7	6.8
Federal research institutions	16.0	1.1	7.7	1.7	3.1	1.7
Other research institutions	48.0	3.3	46.1	10.3	15.8	8.5
Industry and commercial enterprises			**6.4**	**1.4**	**4.5**	**2.4**
Institutions overall	**1,465.2**	**100.0**	**449.6**	**100.0**	**187.0**	**100.0**

[1] Funding for German and institutional recipients only.
[2] For comparison purposes, the funding amounts for Horizon 2020 shown here have been converted to a three-year period corresponding to the years under consideration for the funding amounts provided by the DFG and the federal government. In total, the institutions under consideration here have received €374.1 million under the Horizon 2020 programme to date. For further methodological explanations, see the Glossary of Methodological Terms at www.dfg.de/fundingatlas.

Note: Corresponds to Tabelle 4-4 of the DFG Förderatlas 2021.

Data basis and sources:
Deutsche Forschungsgemeinschaft (DFG, German Research Foundation): DFG awards for 2017 to 2019.
EU Office of the BMBF: Participation in Horizon 2020. EU Framework Programme for Research and Innovation (project data as of 12 May 2020).
Federal Ministry for Economic Affairs and Climate Action (BMWK): Funding for the Central Innovation Programme for SMEs (ZIM) 2017 to 2019.
Federal Ministry of Education and Research (BMBF): Direct R&D project funding from the federal government 2017 to 2019 (PROFI project database).
Calculations by the DFG.

Research Units.[6] The network in the humanities and social sciences resulting from these joint participations is shown in Figure 5-5.

Similar analyses for the other scientific disciplines are to be found in the respective chapters. In the figures, the diameters of the circles reflect the number of participations per institution, regardless of the number of persons involved, starting from participation in two and more consortia funded under these funding instruments. The connecting lines indicate two or more joint participations in consortia under the funding instruments mentioned.

Multifaceted Links Between the Berlin and Munich Regions

A particularly large number of participations can be seen in consortia in the humanities and social sciences at the two Berlin HEIs **FU Berlin** and **HU Berlin** as well as **LMU Munich** in Bavaria (see Figure 5-5). In addition, the universities **Cologne**, **Tübingen**, **Bonn**, **Hamburg** and **Münster** in particular are involved in consortia in this scientific discipline. As in the reporting periods 2014 to 2016 (DFG, 2019: 61) and 2011 to 2013 (DFG, 2016: 58), there is a distinct clustering in Berlin that has remained stable over time, which is shaped by the two aforementioned HEIs but also includes numerous other HEIs and non-university institutions in Berlin and in the wider region in its collaborations.

In other regions, clusters are less dense and spread over a wider area. However, the network in the humanities and social sciences shows a particularly striking pattern of cross-regional connections. In particular, **LMU Munich** and the HEIs and non-university institutions in the Berlin region are involved in a large number of joint projects.

Stable Trend Towards Deconcentration in the Humanities and Social Sciences

The trend towards deconcentration of DFG awards noted in the 2018 Funding Atlas continues in the period under review here, also in the humanities and social sciences (DFG, 2019: 60). Over time, DFG awards are spread

6 See also the Glossary of Methodological Terms under "Cartographic network analyses" at www.dfg.de/fundingatlas.

Figure 5-5:
Participations by research institutions in DFG-funded Coordinated Programmes and resulting cooperative relationships 2017 to 2019 in the humanities and social sciences

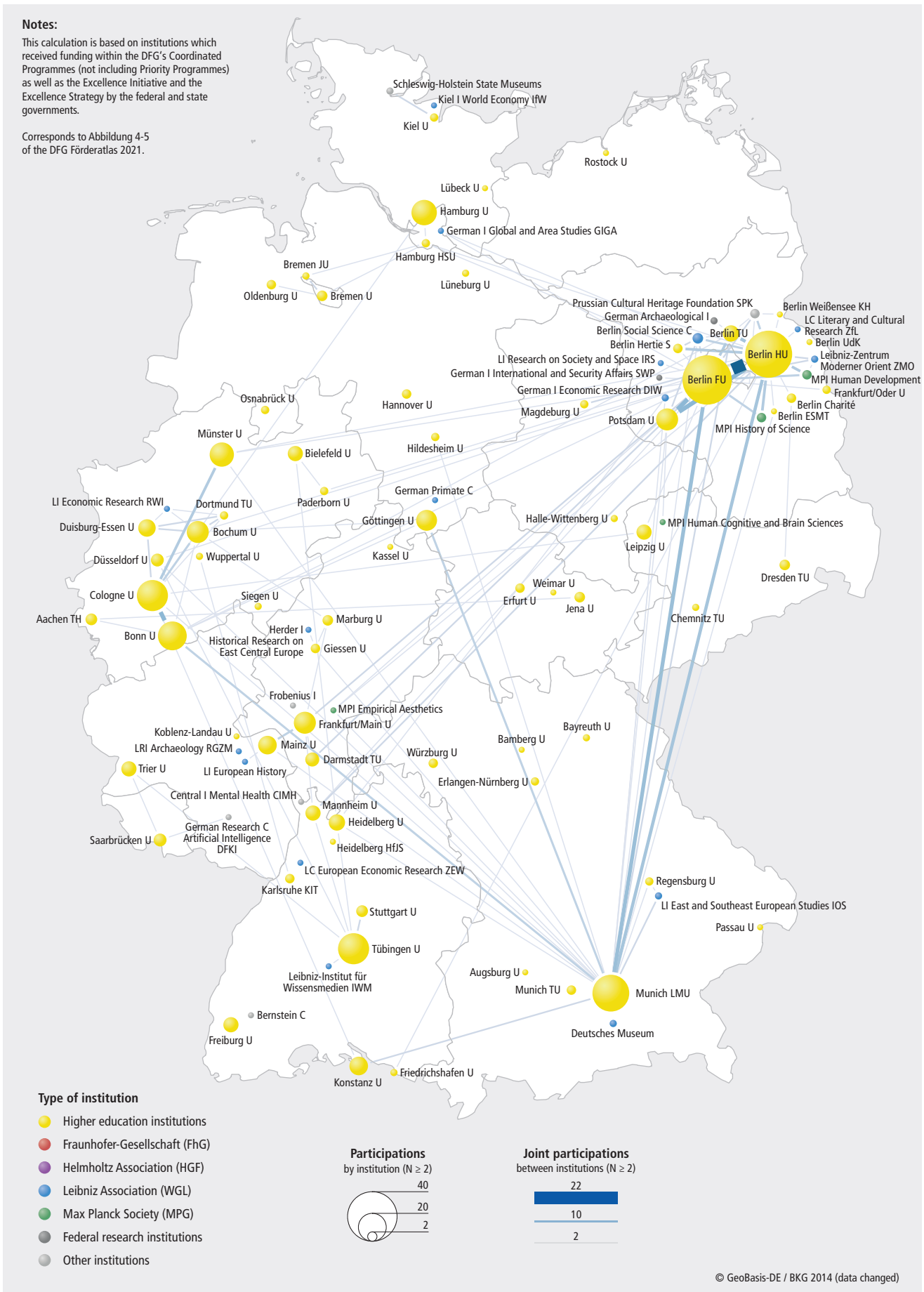


Table 5-5:
The higher education institutions with the highest DFG awards for 2017 to 2019 in absolute figures and relative to staff size in the humanities and social sciences

DFG awards (absolute)		DFG awards relative to staff size[1]					
Higher education institution	Total	Higher education institution	Professorial staff		Higher education institution	Researchers	
	€m		N	€ thousand per prof.		N	€ thousand per res.
Berlin FU	87.5	Berlin TU	50	321.9	Konstanz U	567	67.3
Munich LMU	75.7	Konstanz U	132	290.0	Berlin FU	1,472	59.4
Tübingen U	70.6	Tübingen U	254	278.5	Tübingen U	1,307	54.0
Berlin HU	64.6	Berlin FU	336	260.5	Berlin TU	325	49.2
Frankfurt/Main U	55.0	Munich LMU	332	227.7	Berlin HU	1,430	45.1
Cologne U	50.3	Saarbrücken U	102	219.7	Saarbrücken U	515	43.7
Hamburg U	48.3	Freiburg U	150	217.1	Munich LMU	1,996	37.9
Münster U	46.1	Berlin HU	318	202.8	Frankfurt/Main U	1,530	35.9
Konstanz U	38.2	Heidelberg U	194	195.8	Heidelberg U	1,100	34.5
Heidelberg U	37.9	Mannheim U	169	189.8	Mannheim U	942	34.1
Bochum U	33.3	Stuttgart U	50	180.1	Bonn U	948	33.9
Bielefeld U	32.7	Munich TU	75	174.1	Freiburg U	996	32.7
Freiburg U	32.6	Bielefeld U	196	167.1	Hamburg U	1,499	32.2
Göttingen U	32.4	Frankfurt/Main U	333	165.1	Bielefeld U	1,044	31.3
Bonn U	32.2	Münster U	297	155.3	Lüneburg U	367	28.5
Mannheim U	32.1	Bonn U	208	154.6	Göttingen U	1,166	27.8
Leipzig U	26.7	Düsseldorf U	121	147.4	Giessen U	843	27.4
Mainz U	23.3	Göttingen U	221	146.5	Münster U	1,750	26.4
Giessen U	23.1	Hamburg U	332	145.3	Bochum U	1,331	25.0
Saarbrücken U	22.5	Bremen U	135	142.1	Trier U	589	24.1
Ranked 1–20	**864.9**	**Ranked 1–20**	**4,005**	**215.9**	**Ranked 1–20**	**21,718**	**39.8**
Other HEIs[2]	**470.8**	**Other HEIs[2]**	**19,495**	**24.1**	**Other HEIs[2]**	**57,553**	**8.2**
HEIs overall	**1,335.6**	**HEIs overall**	**23,500**	**56.8**	**HEIs overall**	**79,271**	**16.8**
of which: universities	**1,319.2**	**of which: universities**	**11,326**	**116.5**	**of which: universities**	**57,858**	**22.8**
Based on: N HEIs	**161**	**Based on: N HEIs**	**398**	**158**	**Based on: N HEIs**	**413**	**160**

[1] Only HEIs which employed more than 20 professors or 100 or more researchers in the scientific discipline under consideration during 2018 were included within the scope of this calculation.
[2] Please see Tables Web-6 and Web-8 at www.dfg.de/fundingatlas for data on other higher education institutions.

Note: Corresponds to Tabelle 4-5 of the DFG Förderatlas 2021.

Data basis and sources:
Deutsche Forschungsgemeinschaft (DFG. German Research Foundation): DFG awards for 2017 to 2019.
Federal Statistical Office (Destatis): Education and Culture. Personnel at Higher Education Institutions 2018. Special analysis of Subject-Matter Series 11, Series 4.4.
Calculations by the DFG.

across more and more institutions, while the differences in individually acquired award volumes tend to decline.

The ranking of universities based on DFG funding volume shows only a few changes at the top compared to the prior period (see Table 5-5). **FU Berlin** remains in 1st place with €87.5 million, now followed by **LMU Munich** with €75.7 million and **U Tübingen** with €70.6 million, each moving up one place. Then comes **HU Berlin** with €64.6 million, followed by **U Frankfurt/Main** and **U Cologne** with more than €50 million in DFG awards each. **U Bochum** made a significant leap upwards and now ranks 11th (2018: 20th place).

When adjusted for staff size[7], a technical university leads the way, namely **TU Berlin**,

7 See also the Glossary of Methodological Terms under "HEI staff" at www.dfg.de/fundingatlas.

having increased its per capita funding in relation to the number of professors to almost €322,000. It is followed by **U Konstanz** (still ranked first in 2018), which is now in 9th place in the absolute ranking, and **U Tübingen** (formerly ranked 4th).

DAAD, AvH and ERC Funding Recipients by HEI

In the period under review, the Alexander von Humboldt Foundation funded a total of almost 1,600 visiting fellowships by foreign researchers to German HEIs in the humanities and social sciences (see Table 5-6) – about one third of the total number of research visits funded by the AvH.

As in previous years, **HU Berlin**, **FU Berlin** and **LMU Munich** hosted the largest number of AvH funding recipients. A similar pattern emerges at the top for DAAD-funded visiting researchers. In the previous reporting period, large HEIs based in major cities and very active in research were also highly attractive to large numbers of foreign researchers in the humanities and social sciences.

ERC grants, now covering the period 2014 to 2019, likewise reveal a familiar pattern.[8] As in the last Funding Atlas, the table is headed by **LMU Munich** with 18 funding recipients. It is followed by **FU Berlin** with seven and **U Frankfurt/Main**, **U Cologne** and **U Tübingen** with five funding recipients each. A total of 39 HEIs offered ERC grantees in the humanities and social sciences the opportunity to conduct their research during the reporting period. Data on the number of AvH, DAAD and ERC funding recipients at these and other HEIs are to be found in the DFG Funding Atlas online supplement at www.dfg.de/fundingatlas in Tables Web-27 and Web-29 to Web-31.

5.3 Funding Profiles in the Life Sciences

In the period from 2017 to 2019, a total of almost €3.2 billion was awarded by the DFG for research projects in the life sciences, an increase of 15% compared to the reporting period covered by the last Funding Atlas edition (DFG, 2019: 64). The share of the DFG's total budget taken up by the life sciences has remained the same at around 34%, making the life sciences the largest of the four scientific disciplines.

For the subject-specific analysis of the DFG's funding activities in the life sciences, the system used is based on three research areas divided into seven research fields. Figure 5-6 indicates how these break down in terms of the total life sciences funding volume from 2017 to 2019. In this context, the three research areas of basic research in biology and medicine, as well as agricultural, forestry and veterinary medicine, shown in different shades of red, provide for the framework of the following analysis.

The largest amount was acquired by researchers for projects classified in the research field of medicine, where a total of some €1.1 billion was made available for research projects from 2017 to 2019. This makes it the DFG's most extensive research field. It is followed by basic research in biology and medicine, then neuroscience, with funding amounts of €663 million and €517 million respectively.

Detailed analyses of DFG funding profiles for HEIs and non-university research institutions by individual research areas and research fields as distinguished in the Voronoi presentation above are to be found in the form of tables at www.dfg.de/fundingatlas (Table Web-9 and Web-19).

Federal Government Project Funding Increased by 11% in the Life Sciences

In the life sciences, too, HEIs in particular are recipients of DFG funding. Out of a total of almost €3.2 billion, universities and HEIs received around 87% (see Table 5-7). Federal government R&D project funding increased significantly by 11% compared to the figures contained in the Funding Atlas 2018 (DFG, 2019: 64). In the life sciences, non-university research institutions are much more strongly represented in terms of federal government and EU funding than in connection with DFG funding. In both cases, the Helmholtz Association accounts for a large share, with its centres focusing on medical research such as the **German Cancer Research Center (DKFZ)** and **Helmholtz Zentrum München – German Research Center for Environmental Health (HMGU)** attracting a total of almost

8 See also the Glossary of Methodological Terms under "ERC funding" at www.dfg.de/fundingatlas.

Table 5-6:
The most frequently selected host universities by AvH, DAAD and ERC funding recipients in the humanities and social sciences

AvH funding recipients		DAAD funding recipients		ERC funding recipients	
Higher education institution	N	**Higher education institution**	N	**Higher education institution**	N
Berlin HU	182	Berlin FU	184	Munich LMU	18
Berlin FU	181	Berlin HU	159	Berlin FU	7
Munich LMU	149	Munich LMU	103	Cologne U	5
Heidelberg U	75	Frankfurt/Main U	71	Frankfurt/Main U	5
Cologne U	70	Tübingen U	64	Tübingen U	5
Frankfurt/Main U	69	Bonn U	58	Göttingen U	4
Freiburg U	60	Heidelberg U	57	Hamburg U	4
Bonn U	55	Hamburg U	55	Bochum U	3
Tübingen U	53	Leipzig U	54	Bonn U	3
Göttingen U	49	Göttingen U	43	Bremen U	3
Hamburg U	48	Marburg U	41	Düsseldorf U	3
Münster U	45	Cologne U	40	Freiburg U	3
Konstanz U	35	Bochum U	39		
Bochum U	28	Freiburg U	39		
Halle-Wittenberg U	28	Halle-Wittenberg U	39		
Berlin TU	26	Mainz U	36		
Leipzig U	26	Münster U	35		
Marburg U	25	Potsdam U	34		
Potsdam U	22	Berlin TU	26		
Bayreuth U	21	Frankfurt/Oder U	26		
Mainz U	21				
Ranked 1–20	**1,268**	**Ranked 1–19**	**1,203**	**Ranked 1–8**	**63**
Other HEIs[1)]	**327**	**Other HEIs[1)]**	**422**	**Other HEIs[1)]**	**36**
HEIs overall	**1,595**	**HEIs overall**	**1,625**	**HEIs overall**	**99**
Based on: N HEIs	**89**	**Based on: N HEIs**	**61**	**Based on: N HEIs**	**39**

[1)] Please see Table Web-27, Web-29 and Web-30 at www.dfg.de/fundingatlas for data on other higher education institutions.

Note: Corresponds to Tabelle 4-7 of the DFG Förderatlas 2021.

Data basis and sources:
Alexander von Humboldt Foundation (AvH): Research visits by AvH guest researchers from 2015 to 2019.
EU Office of the BMBF: ERC funding 2014 to 2019 in Horizon 2020. EU Framework Programme for Research and Innovation (project data as of 12 May 2020). Figures include Starting Grants, Advanced Grants and Consolidator Grants.
German Academic Exchange Service (DAAD): Research visits by DAAD guest researchers 2015 to 2019.
Calculations by the DFG.

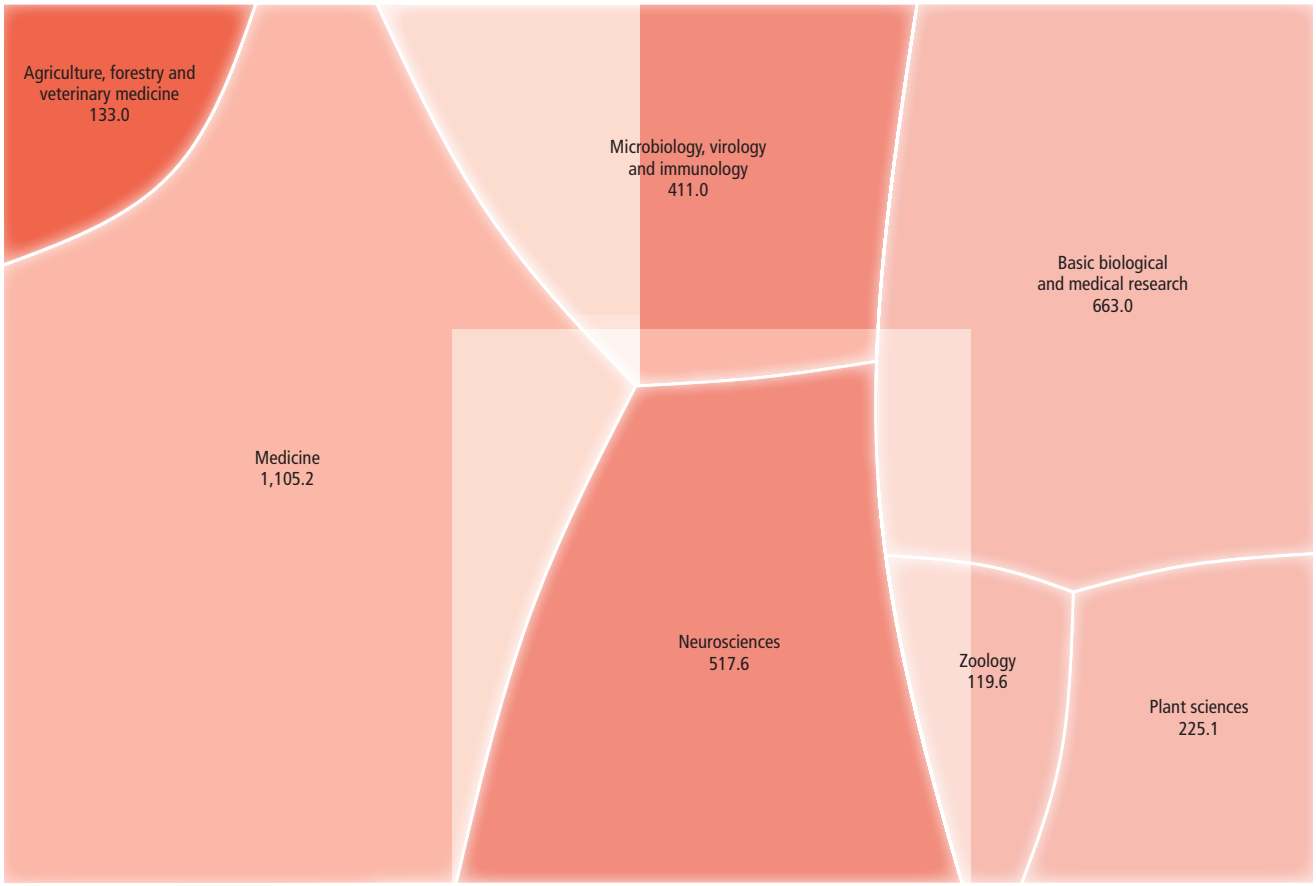
6% of federal government funding in the life sciences. In terms of federal government funding, the Fraunhofer-Gesellschaft (FhG) is represented to a similar extent, while the same applies to the Max Planck Society in connection with EU funding.

An overview of the HEIs and non-university research institutions which obtain DFG, federal government and EU funding in the life sciences is to be found in Tables Web-9, Web-15, Web-19, Web-23, Web-24, Web-26 and Web-28 at www.dfg.de/fundingatlas.

In Addition to Berlin and Munich, Regional Clusters are Formed by Göttingen, Heidelberg and Leipzig-Halle-Jena

More than 470 consortia, 60 of which belong to the Excellence Initiative and the Excellence Strategy, form an exceptionally dense and cross-regional collaborative network in the life sciences, as shown in Figure 5-7 (see chapter 5.2). This involves a total of 200 institutions, including over 70 HEIs. Due to this density, the diagram differs from

Figure 5-6:
DFG awards for 2017 to 2019 by research field in the life sciences



Note: Areas are proportionate to funding distribution. Figures are in millions of euros. Corresponds to Abbildung 4-6 of the DFG Förderatlas 2021.

Data basis and source:
Deutsche Forschungsgemeinschaft (DFG, German Research Foundation): DFG awards for 2017 to 2019.
Calculations by the DFG.

that of the other scientific disciplines in that it only shows joint institutional participations and the participation of individual institutions from a threshold figure of three. Clearly, the collaborative network in the life sciences is much more dense than is technically possible to illustrate here.

As already described in the previous Funding Atlas (DFG, 2019: 65), marked cooperation clusters are firstly to be found in the Berlin area. Close interaction is evident here between **Charité Berlin**, **FU Berlin**, **HU Berlin** and the **Max Delbrück Center for Molecular Medicine in the Helmholtz Association (MDC)**, as well as between a large number of smaller institutions such as the **Leibniz-Forschungsinstitut für Molekulare Pharmakologie (FMP)** and the **Robert Koch Institute (RKI)**. Secondly, the Munich region is a key focus area for life sciences consortia. With 38 joint participations, **LMU Munich** and **TU Munich** exhibit by far the strongest connection between two institutions. The Munich quartet is completed by **Helmholtz Zentrum** München – German Research Center **for Environmental Health (HMGU)** and the **Max Planck Institute of Biochemistry (MPIB)**.

Further clusters are formed by the regions of Göttingen, Leipzig-Halle-Jena and Heidelberg. **U Göttingen** cooperates in particular with non-university institutions in the region, including the **Max Planck Institute for Biophysical Chemistry – Karl Friedrich Bonhoeffer Institute (MPIBPC)** and the **Max Planck Institute for Experimental Medicine (MPIEM)**.

Stable Ranking of HEIs in the Life Sciences

Table 5-8 shows the HEIs with the highest DFG awards for the period 2017 to 2019 in

Table 5-7:
Participation[1] in DFG, federal government and EU funding programmes for research by type of institution in the life sciences

Type of institution	DFG awards		Direct R&D project funding from the federal government		R&D funding in Horizon 2020[2]	
	€m	%	€m	%	€m	%
Higher education institutions	**2,762.4**	**87.0**	**1,101.1**	**55.6**	**398.6**	**46.7**
Non-university research institutions	**412.0**	**13.0**	**541.4**	**27.3**	**332.2**	**38.9**
Fraunhofer-Gesellschaft (FhG)	1.4	0.0	92.5	4.7	23.1	2.7
Helmholtz Association (HGF)	101.2	3.2	93.1	4.7	84.4	9.9
Leibniz Association (WGL)	93.1	2.9	74.0	3.7	27.8	3.3
Max Planck Society (MPG)	129.1	4.1	35.7	1.8	87.2	10.2
Federal research institutions	19.8	0.6	47.2	2.4	26.8	3.1
Other research institutions	67.3	2.1	199.1	10.0	82.9	9.7
Industry and commercial enterprises			**339.2**	**17.1**	**123.1**	**14.4**
Institutions overall	**3,174.4**	**100.0**	**1,981.8**	**100.0**	**853.8**	**100.0**

[1] Funding for German and institutional recipients only.
[2] For comparison purposes, the funding amounts for Horizon 2020 shown here have been converted to a three-year period corresponding to the years under consideration for the funding amounts provided by the DFG and the federal government. In total, the institutions under consideration here have received €1,707.6 million under the Horizon 2020 programme to date. For further methodological explanations, see the Glossary of Methodological Terms at www.dfg.de/fundingatlas.

Note: Corresponds to Tabelle 4-8 of the DFG Förderatlas 2021.

Data basis and sources:
Deutsche Forschungsgemeinschaft (DFG, German Research Foundation): DFG awards for 2017 to 2019.
EU Office of the BMBF: Participation in Horizon 2020. EU Framework Programme for Research and Innovation (project data as of 12 May 2020).
Federal Ministry for Economic Affairs and Climate Action (BMWK): Funding for the Central Innovation Programme for SMEs (ZIM) 2017 to 2019.
Federal Ministry of Education and Research (BMBF): Direct R&D project funding from the federal government 2017 to 2019 (PROFI project database).
Calculations by the DFG.

the life sciences, both in absolute terms and relative to staff[9]. In total, research projects at 103 HEIs were funded with a total of almost €2.8 billion. **LMU Munich** leads the table by a clear margin with a funding amount of €177 million. **U Heidelberg**, **U Freiburg**, **U Göttingen** and **TU Munich** were also awarded funding of more than €100 million. Such high amounts are the exception across the scientific disciplines: only in the engineering sciences did two HEIs achieve comparable success.

Another striking point is how stable the ranking has remained: compared to the DFG Funding Atlas 2018 there have been no changes in places 1 to 6, and even in places 7 and 8, **U Frankfurt/Main** and **FU Berlin** have simply swapped positions (DFG, 2019: 67).

Compared in terms of funding adjusted for the number of professors, **U Konstanz** – closely followed by **TU Munich** and **U Freiburg** – was able to attract the largest volumes of funding from the DFG. **U Konstanz** stands out here because it does not have a medical department: however, its mathematics and natural sciences section works on numerous projects related to the life sciences. **U Göttingen**, **U Frankfurt/Main**, **U Magdeburg** and **LMU Munich** are ranked 4th to 7th with a funding amount of €667,000 to €684,000 per full-time professor. One university with a smaller medical faculty is conspicuous here, namely **U Magdeburg**, which has climbed the relative ranking from 13th to 6th place.

Separate Analysis for University Medical Institutions

This edition also features a separate analysis of DFG awards to university medical institutions, which appeared for the first time in the Funding Atlas 2012 (DFG, 2012: 165ff.). Updated analyses, prepared in cooperation with the German Medical Faculty Association[10], are provided in Tables Web-20 and Web-21 at www.dfg.de/fundingatlas.

9 See also the Glossary of Methodological Terms under "HEI staff" at www.dfg.de/fundingatlas.

10 See also www.mft-online.de and www.landkarte-hochschulmedizin.de.

Figure 5-7:
Participations by research institutions in DFG-funded Coordinated Programmes and resulting cooperative relationships 2017 to 2019 in the life sciences

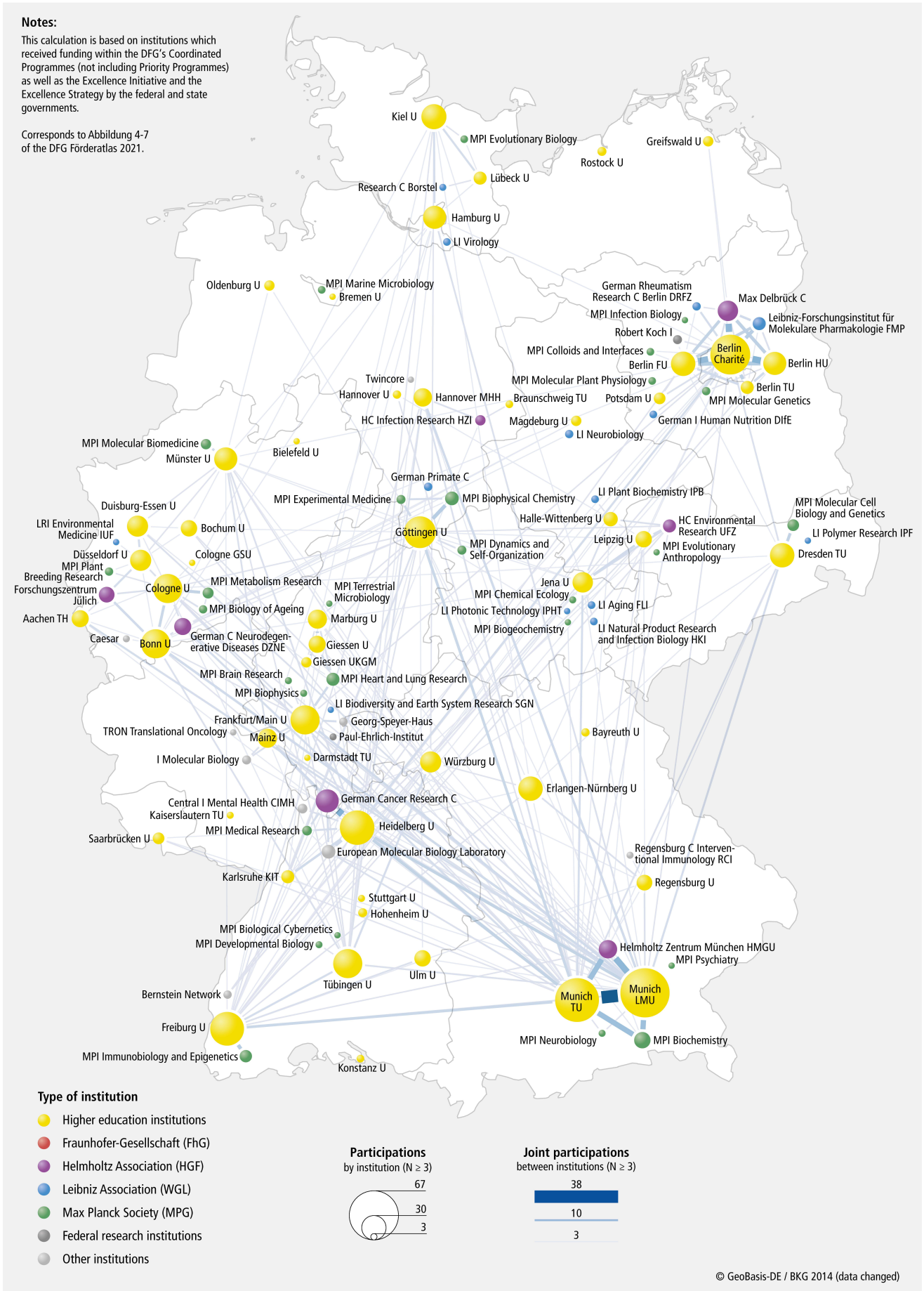


Table 5-8:
The higher education institutions with the highest DFG awards for 2017 to 2019 in absolute figures and relative to staff size in the life sciences

DFG awards (absolute)		DFG awards[1] relative to staff size					
Higher education institution	Total	Higher education institution	Professorial staff		Higher education institution	Researchers	
	€m		N	€ thousand per prof.		N	€ thousand per res.
Munich LMU	176.9	Konstanz U	23	932.0	Karlsruhe KIT	107	105.3
Heidelberg U	150.2	Munich TU	144	887.3	Konstanz U	222	96.9
Freiburg U	147.0	Freiburg U	172	853.4	Lübeck U	510	82.2
Göttingen U	128.8	Göttingen U	188	683.7	Berlin TU	104	71.6
Munich TU	128.0	Frankfurt/Main U	144	673.4	Kaiserslautern TU	152	61.3
Tübingen U	99.5	Magdeburg U	34	667.8	Hannover U	197	59.6
Frankfurt/Main U	97.0	Munich LMU	265	666.5	Bochum U	483	59.0
Berlin FU	96.1	Cologne U	151	591.5	Oldenburg U	387	58.5
Hamburg U	93.6	Tübingen U	169	589.8	Bayreuth U	183	53.4
Münster U	92.9	Hannover MHH	141	582.3	Osnabrück U	241	48.4
Cologne U	89.4	Münster U	162	572.2	Göttingen U	2,677	48.1
Bonn U	88.5	Heidelberg U	269	558.7	Stuttgart U	137	46.4
Hannover MHH	82.1	Oldenburg U	42	537.9	Munich TU	2,799	45.7
Berlin HU	80.5	Kiel U[3]	169	536.3	Frankfurt/Main U	2,163	44.8
Erlangen-Nürnberg U	79.7	Dresden TU	144	535.1	Darmstadt TU	152	43.8
Würzburg U	79.4	Ulm U	118	530.2	Freiburg U	3,438	42.7
Dresden TU	77.1	Bochum U	55	517.6	Potsdam U	351	41.8
Düsseldorf U	68.8	Potsdam U	29	505.0	Munich LMU	4,333	40.8
Ulm U	62.3	Erlangen-Nürnberg U	160	498.0	Braunschweig TU	238	37.6
Mainz U	55.6	Hamburg U	198	473.4	Regensburg U	1,356	35.7
Ranked 1–20	**1,973.2**	**Ranked 1–20**	**2,778**	**710.2**	**Ranked 1–20**	**20,230**	**97.5**
Other HEIs[2]	**789.3**	**Other HEIs[2]**	**4,494**	**175.6**	**Other HEIs[2]**	**67,236**	**11.7**
HEIs overall	**2,762.4**	**HEIs overall**	**7,272**	**379.9**	**HEIs overall**	**87,466**	**31.6**
of which: universities	**2,758.3**	**of which: universities**	**5,810**	**474.8**	**of which: universities**	**83,982**	**32.8**
Based on: N HEIs	**103**	**Based on: N HEIs**	**193**	**86**	**Based on: N HEIs**	**204**	**88**

[1] Only HEIs which employed more than 20 professors or 100 or more researchers in the scientific discipline under consideration during 2018 were included within the scope of this calculation.
[2] Please see Tables Web-6 and Web-9 at www.dfg.de/fundingatlas for data on other higher education institutions.
[3] For figures relative to number of professors, including University Medical Center Schleswig-Holstein. Please see "HEI personnel" in the Glossary of Methodological Terms at www.dfg.de/fundingatlas for more information.

Note: Corresponds to Tabelle 4-9 of the DFG Förderatlas 2021.

Data basis and sources:
Deutsche Forschungsgemeinschaft (DFG, German Research Foundation): DFG awards for 2017 to 2019.
Federal Statistical Office (Destatis): Education and Culture. Personnel at Higher Education Institutions 2018. Special analysis of Subject-Matter Series 11, Series 4.4.
Calculations by the DFG.

DAAD, AvH and ERC Funding Recipients by HEI

U Göttingen is particularly attractive to international researchers. As in the 2015 Funding Atlas (DFG, 2016: 63ff.) and the 2018 Funding Atlas (DFG, 2019: 65), this university in Lower Saxony continues to top the list of host HEIs for AvH and DAAD funding recipients (see Table 5-9). In the case of the AvH, **U Heidelberg** and **U Tübingen** follow as popular destination institutions for funded guest researchers; in the case of the DAAD, the leaders are **U Giessen** and also **U Tübingen**, in all three cases traditional universities that have already made a name for themselves far beyond Germany's borders (see chapter 4.4). With regard to ERC grantees, as in the 2018 Funding Atlas, it is the two HEIs based in the Bavarian capital – **LMU Munich**

Table 5-9:
The most frequently selected host universities by AvH, DAAD and ERC funding recipients in the life sciences

AvH funding recipients		DAAD funding recipients		ERC funding recipients	
Higher education institution	N	**Higher education institution**	N	**Higher education institution**	N
Göttingen U	45	Göttingen U	43	Munich LMU	24
Heidelberg U	40	Giessen U	29	Munich TU	19
Tübingen U	38	Tübingen U	27	Dresden TU	9
Munich TU	32	Freiburg U	24	Freiburg U	9
Munich LMU	31	Berlin FU	23	Cologne U	8
Berlin FU	29	Hohenheim U	22	Frankfurt/Main U	8
Freiburg U	28	Heidelberg U	20	Heidelberg U	8
Cologne U	25	Munich TU	20	Göttingen U	7
Bonn U	24	Münster U	20	Berlin FU	6
Berlin HU	22	Bonn U	19	Berlin HU	6
Würzburg U	22	Berlin HU	16	Hamburg U	6
Erlangen-Nürnberg U	19	Leipzig U	16	Tübingen U	6
Hamburg U	19	Würzburg U	15	Würzburg U	6
Mainz U	17	Dresden TU	13	Hannover MHH	5
Frankfurt/Main U	16	Aachen TH	12	Münster U	3
Leipzig U	16	Duisburg-Essen U	12		
Düsseldorf U	15	Hannover U	12		
Giessen U	12	Munich LMU	12		
Kiel U	12	Halle-Wittenberg U	11		
Bayreuth U	11	Kiel U	10		
Ranked 1–20	**473**	**Ranked 1–20**	**376**	**Ranked 1–15**	**129**
Other HEIs[1)]	**211**	**Other HEIs[1)]**	**154**	**Other HEIs[1)]**	**31**
HEIs overall	**684**	**HEIs overall**	**530**	**HEIs overall**	**160**
Based on: N HEIs	**63**	**Based on: N HEIs**	**53**	**Based on: N HEIs**	**38**

[1)] Please see Tables Web-27, Web-29 and Web-30 at www.dfg.de/fundingatlas for data on other higher education institutions.

Note: Corresponds to Tabelle 4-11 of the DFG Förderatlas 2021.

Data basis and sources:
Alexander von Humboldt Foundation (AvH): Research visits by AvH guest researchers from 2015 to 2019.
EU Office of the BMBF: ERC funding 2014 to 2019 in Horizon 2020. EU Framework Programme for Research and Innovation (project data as of 12 May 2020). Figures include Starting Grants, Advanced Grants and Consolidator Grants.
German Academic Exchange Service (DAAD): Research visits by DAAD guest researchers 2015 to 2019.
Calculations by the DFG.

and **TU Munich** – that top the ranking. **U Freiburg** and **TU Dresden** follow in 3rd and 4th place respectively.

Detailed information on the number of AvH, DAAD and ERC funding recipients per HEI and non-university research institution is be found in the DFG Funding Atlas online supplement at www.dfg.de/fundingatlas, Tables Web-27 and Web-29 to Web-31.

5.4 Funding Profiles in the Natural Sciences

After the life sciences, the scientific discipline of the natural sciences received the largest volume of DFG funding during the period under review, being awarded more than €2 billion for the first time (see Tables 5-2 and 5-10). Despite this increase, the natural sciences' share of around 21% of the DFG's total funding has not changed.

Figure 5-8 first shows how DFG awards are distributed among the four research areas distinguished in the natural sciences across a total of 18 research fields. The highest amount in the reporting period 2017 to 2019 is accounted for by the total of five research fields of physics (around 38%), followed by chemistry, the geosciences and finally mathematics – the smallest single research area in the natural sciences that is also a research field in its own right.

The highest amount in absolute terms was acquired for projects focusing on condensed matter physics (€323.6 million), which reflects a slight decrease for this research field compared to the last reporting period from 2014 to 2016 (DFG, 2019: 72). The next largest single research field is mathematics with €257.2 million, followed almost equally by molecular chemistry with €164.1 million and the research field of particles, nuclei and fields with €162.8 million.

Detailed analyses of DFG funding profiles for HEIs and non-university research institutions by individual research areas and research fields as distinguished in the Voronoi presentation above are to be found in the form of tables at www.dfg.de/fundingatlas (Table Web-9 and Web-19).

The Natural Sciences Carry a Similar Weight in Terms of DFG and Federal Government Funding

The federal government funding areas attributed to the natural sciences accounted for a similarly high amount of over €1.9 billion during the same period (see Table 5-10). However, these two funding providers serve very different target groups. While the DFG primarily supported research at HEIs with almost 87% of its awards, scientists at non-university research institutions received the largest share from the federal government, namely 45%.

In the non-university sector, the Helmholtz Association is the main organisation to have projects funded by the federal government. A total of almost €243 million of the federal government's direct R&D funding for non-university research institutions went to the HGF, in other words a good third. Exam-

Figure 5-8:
DFG awards for 2017 to 2019 by research field in the natural sciences

Note: Areas are proportionate to funding distribution. Figures are in millions of euros. Corresponds to Abbildung 4-8 of the DFG Förderatlas 2021.

Data basis and source:
Deutsche Forschungsgemeinschaft (DFG, German Research Foundation): DFG awards for 2017 to 2019.
Calculations by the DFG.

Table 5-10:
Participation[1] in DFG, federal government and EU funding programmes for research by type of institution in the natural sciences

Type of institution	DFG awards		Direct R&D project funding from the federal government		R&D funding in Horizon 2020[2]	
	€m	%	€m	%	€m	%
Higher education institutions	**1,765.4**	**86.8**	**745.9**	**39.1**	**221.6**	**48.8**
Non-university research institutions	**269.3**	**13.2**	**859.0**	**45.0**	**191.7**	**42.2**
Fraunhofer-Gesellschaft (FhG)	2.1	0.1	70.5	3.7	10.1	2.2
Helmholtz Association (HGF)	84.8	4.2	242.9	12.7	58.5	12.9
Leibniz Association (WGL)	69.4	3.4	82.4	4.3	25.3	5.6
Max Planck Society (MPG)	83.2	4.1	69.6	3.6	58.6	12.9
Federal research institutions	12.9	0.6	27.9	1.5	2.4	0.5
Other research institutions	16.8	0.8	365.8	19.2	36.8	8.1
Industry and commercial enterprises			**304.9**	**16.0**	**41.1**	**9.0**
Institutions overall	**2,034.7**	**100.0**	**1,909.8**	**100.0**	**454.4**	**100.0**

[1] Funding for German and institutional recipients only.
[2] For comparison purposes, the funding amounts for Horizon 2020 shown here have been converted to a three-year period corresponding to the years under consideration for the funding amounts provided by the DFG and the federal government. In total, the institutions under consideration here have received €908.7 million under the Horizon 2020 programme to date. For further methodological explanations, see the Glossary of Methodological Terms at www.dfg.de/fundingatlas.

Note: Corresponds to Tabelle 4-13 of the DFG Förderatlas 2021.

Data basis and sources:
Deutsche Forschungsgemeinschaft (DFG, German Research Foundation): DFG awards for 2017 to 2019.
EU Office of the BMBF: Participation in Horizon 2020. EU Framework Programme for Research and Innovation (project data as of 12 May 2020).
Federal Ministry for Economic Affairs and Climate Action (BMWK): Funding for the Central Innovation Programme for SMEs (ZIM) 2017 to 2019.
Federal Ministry of Education and Research (BMBF): Direct R&D project funding from the federal government 2017 to 2019 (PROFI project database).
Calculations by the DFG.

ples here include the **Deutsches Elektronen-Synchrotron (DESY)** in Hamburg and the **German Aerospace Centre (DLR)** with its headquarters in Cologne. Even taking into account ERC funding, which is divided between four scientific disciplines, and the Marie Skłodowska-Curie Actions, the level of funding provided by the EU in this scientific discipline is relatively low compared to the DFG and the federal government.

Overviews of the total number of HEIs and non-university research institutions in the natural sciences that receive funding from the DFG, the federal government and the EU are to be found in Tables Web-10, Web-19, Web-23, Web-24, Web-26 and Web-28 at www.dfg.de/fundingatlas.

Cross-Regional Collaborations Well Represented in the Natural Sciences

Figure 5-9 indicates a pattern of strongly networked DFG funding in the natural sciences across Germany, based on the joint participation of researchers from different institutions in DFG Coordinated Programmes as well as in consortia under the federal government's and federal states' Excellence Initiative and Excellence Strategy (see chapter 5.2). The diagram clearly indicates strongly networked regional clusters in the natural sciences, but also cross-regional collaboration.

The most strongly networked HEIs are firstly the universities in the aforementioned regions of Berlin (**TU Berlin**, **FU Berlin** and **HU Berlin**) and Munich (**LMU Munich** and **TU Munich**). These HEIs interact very intensely at the regional level, while also involving other local partners (e.g. **U Potsdam** and the **Weierstrass Institute for Applied Analysis and Stochastics (WIAS)** in the Berlin region and the **Max Planck Institute for Extraterrestrial Physics (MPE)** in the Munich region). By contrast, the universities U Bonn and U Heidelberg also show very high levels of networking, but this is much more of a cross-regional nature.

Significant Changes in the Rankings of HEIs in the Natural Sciences

DFG funding in the natural sciences is distributed among 100 HEIs (see Table 5-11). There are significant changes to be seen in the rank-

Figure 5-9:
Participations by research institutions in DFG-funded Coordinated Programmes and resulting cooperative relationships 2017 to 2019 in the natural sciences

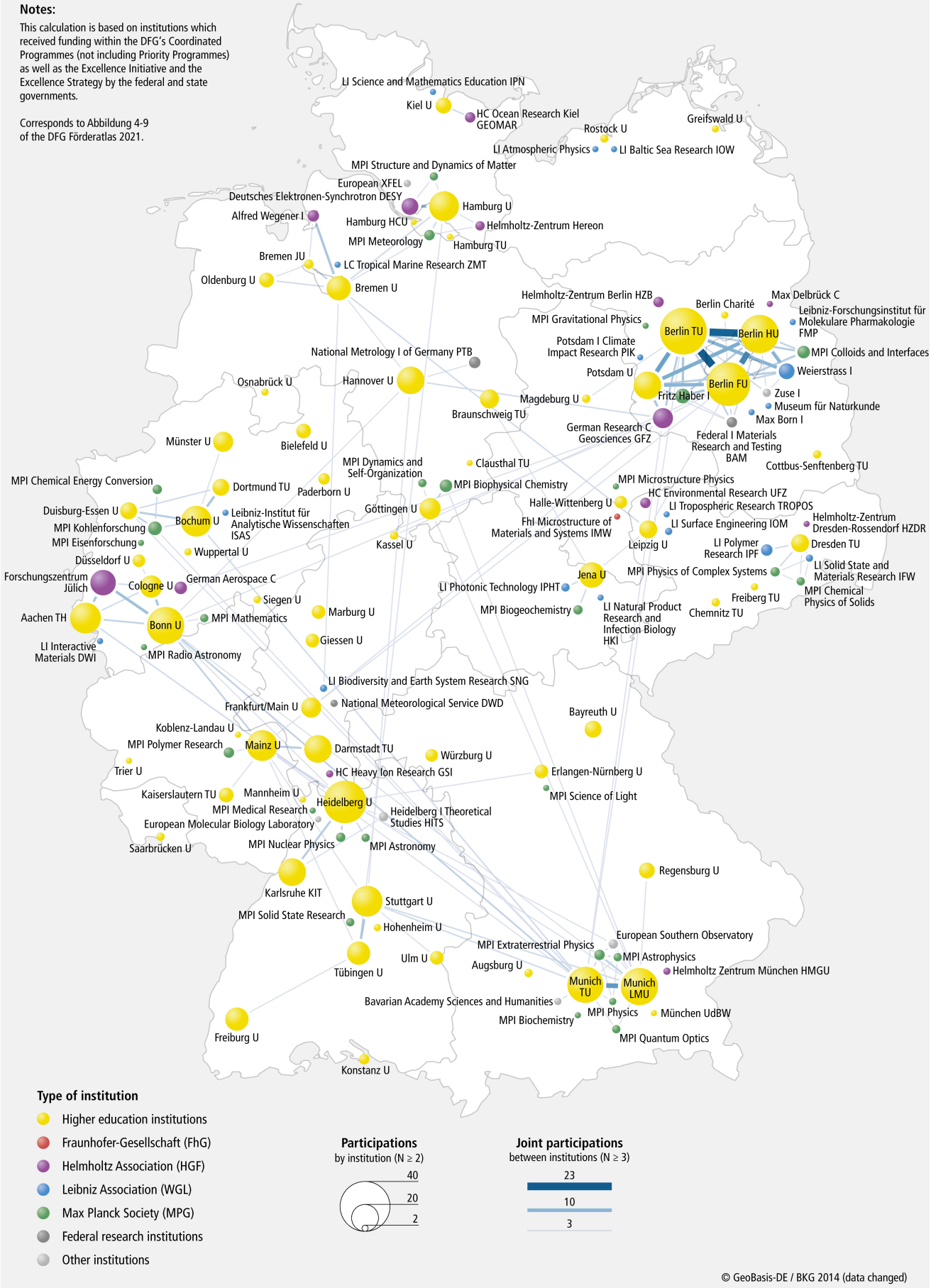


Table 5-11:
The higher education institutions with the highest DFG awards for 2017 to 2019 in absolute figures and relative to staff size in the natural sciences

DFG awards (absolute)		DFG awards[1] relative to staff size					
Higher education institution	Total	Higher education institution	Professorial staff		Higher education institution	Researchers	
	€m		N	€ thousand per prof.		N	€ thousand per res.
Heidelberg U	73.2	Heidelberg U	94	775.9	Berlin TU	583	90.2
Munich TU	68.7	Karlsruhe KIT	94	712.5	Mainz U	782	85.1
Karlsruhe KIT	66.6	Mainz U	97	687.3	Heidelberg U	891	82.1
Mainz U	66.6	Konstanz U	40	677.0	Bremen U	645	75.7
Bonn U	61.6	Regensburg U	54	667.9	Cologne U	757	74.6
Munich LMU	60.2	Bremen U	84	580.8	Leipzig U	493	73.4
Hamburg U	59.3	Berlin TU	91	576.9	Regensburg U	494	73.1
Cologne U	56.5	Munich TU	124	553.3	Karlsruhe KIT	941	70.8
Berlin TU	52.6	Leipzig U	67	536.1	Konstanz U	389	69.9
Münster U	51.7	Cologne U	106	535.5	Berlin FU	691	68.8
Bremen U	48.8	Göttingen U	93	502.4	Kaiserslautern TU	376	68.3
Berlin FU	47.6	Munich LMU	121	497.2	Bonn U	907	67.9
Göttingen U	46.8	Hamburg U	120	496.1	Marburg U	329	67.6
Aachen TH	44.5	Bonn U	126	487.7	Bayreuth U	480	63.6
Hannover U	44.0	Stuttgart U	64	483.7	Hamburg U	970	61.2
Bochum U	41.3	Jena U	82	471.2	Berlin HU	560	61.1
Erlangen-Nürnberg U	41.2	Würzburg U	77	461.9	Hannover U	730	60.2
Jena U	38.6	Freiburg U	69	456.6	Bochum U	705	58.5
Dresden TU	37.0	Marburg U	49	452.3	Halle-Wittenberg U	344	58.5
Darmstadt TU	36.2	Hannover U	97	451.9	Bielefeld U	400	58.2
Ranked 1–20	**1,043.1**	**Ranked 1–20**	**1,750**	**595.9**	**Ranked 1–20**	**12,466**	**83.7**
Other HEIs[2]	**722.3**	**Other HEIs[2]**	**3,224**	**224.0**	**Other HEIs[2]**	**21,642**	**33.4**
HEIs overall	**1,765.4**	**HEIs overall**	**4,975**	**354.9**	**HEIs overall**	**34,107**	**51.8**
of which: universities	**1,762.0**	**of which: universities**	**4,271**	**412.6**	**of which: universities**	**32,511**	**54.2**
Based on: N HEIs	**100**	**Based on: N HEIs**	**146**	**87**	**Based on: N HEIs**	**151**	**88**

[1] Only HEIs which employed more than 20 professors or 100 or more researchers in the scientific discipline under consideration during 2018 were included within the scope of this calculation.
[2] Please see Tables Web-6 and Web-10 at www.dfg.de/fundingatlas for data on other higher education institutions.

Note: Corresponds to Tabelle 4-14 of the DFG Förderatlas 2021.

Data basis and sources:
Deutsche Forschungsgemeinschaft (DFG, German Research Foundation): DFG awards for 2017 to 2019.
Federal Statistical Office (Destatis): Education and Culture. Personnel at Higher Education Institutions 2018. Special analysis of Subject-Matter Series 11, Series 4.4.
Calculations by the DFG.

ing of absolute DFG funding amounts compared to the last edition of the Funding Atlas. **U Heidelberg**, now the leader, was still in 6th place in the reporting period 2014 to 2016, so it has clearly achieved a significant improvement. **KIT Karlsruhe**, now in 3rd place, has also climbed in the ranking by five places. The second-placed HEI, **TU Munich**, also improved its ranking by three places. Another HEI to have climbed in the table is **U Cologne**, which has moved up eight places and is now in 8th position. Finally, **U Leipzig** likewise deserves to be mentioned, having climbed from 31st to 21st place.

Looking at DFG funding amounts relative to staff[11], it can be said that a high absolute DFG funding amount in this scientific discipline generally corresponds to a high per capita funding volume. This perspective also raises the visibility of some smaller HEIs,

11 See also the Glossary of Methodological Terms under "HEI staff" at www.dfg.de/fundingatlas.

Table 5-12:
The most frequently selected host universities by AvH, DAAD and ERC funding recipients in the natural sciences

AvH funding recipients		DAAD funding recipients		ERC funding recipients	
Higher education institution	N	**Higher education institution**	N	**Higher education institution**	N
Munich TU	98	Jena U	35	Munich TU	13
Münster U	82	Karlsruhe KIT	34	Munich LMU	11
Munich LMU	81	Berlin FU	31	Mainz U	8
Berlin TU	78	Dresden TU	30	Berlin FU	6
Karlsruhe KIT	70	Berlin TU	28	Cologne U	6
Bonn U	67	Tübingen U	27	Bochum U	5
Berlin FU	66	Erlangen-Nürnberg U	26	Bonn U	5
Berlin HU	61	Münster U	26	Freiburg U	5
Göttingen U	61	Hannover U	25	Heidelberg U	5
Heidelberg U	60	Potsdam U	25	Berlin HU	4
Aachen TH	55	Cologne U	24	Bremen U	4
Würzburg U	55	Munich TU	22	Dresden TU	4
Regensburg U	54	Stuttgart U	21	Göttingen U	4
Frankfurt/Main U	49	Bremen U	20	Jena U	4
Bochum U	47	Leipzig U	19	Würzburg U	4
Tübingen U	46	Hamburg U	18		
Mainz U	44	Bonn U	17		
Erlangen-Nürnberg U	41	Darmstadt TU	17		
Hannover U	37	Bayreuth U	16		
Hamburg U	35	Bielefeld U	16		
		Braunschweig TU	16		
		Regensburg U	16		
Ranked 1–20	**1,187**	**Ranked 1–19**	**509**	**Ranked 1–10**	**88**
Other HEIs[1)]	**631**	**Other HEIs[1)]**	**345**	**Other HEIs[1)]**	**49**
HEIs overall	**1,818**	**HEIs overall**	**854**	**HEIs overall**	**137**
Based on: N HEIs	**74**	**Based on: N HEIs**	**58**	**Based on: N HEIs**	**38**

[1)] Please see Tables Web-27, Web-29 and Web-30 at www.dfg.de/fundingatlas for data on other higher education institutions.

Note: Corresponds to Tabelle 4-16 of the DFG Förderatlas 2021.

Data basis and sources:
Alexander von Humboldt Foundation (AvH): Research visits by AvH guest researchers from 2015 to 2019.
EU Office of the BMBF: ERC funding 2014 to 2019 in Horizon 2020. EU Framework Programme for Research and Innovation (project data as of 12 May 2020. Figures include Starting Grants, Advanced Grants and Consolidator Grants.
German Academic Exchange Service (DAAD): Research visits by DAAD guest researchers 2015 to 2019.
Calculations by the DFG.

however. **U Konstanz** and **U Regensburg** achieved high per capita awards with relatively few professors in the natural sciences, for example, while **U Bremen**, with its strong geoscientific focus, likewise manages to achieve good visibility as a comparatively small HEI.

DAAD, AvH and ERC Funding Recipients by HEI

DAAD visiting researchers funded in the natural sciences are frequently hosted by the universities of **U Jena** and **KIT Karlsruhe**, revealing a different target institution compared to AvH and ERC-funded researchers (see Table 5-12). **FU Berlin** is also popular among Berlin HEIs, while AvH funding recipients prefer **TU Berlin**. **TU Dresden** is another HEI located in the eastern part of Germany that is among the top five destinations for DAAD funding recipients.

Researchers who receive funding from the Alexander von Humboldt Foundation, which allocates approximately 40% of its funding to this scientific discipline (see Table 5-3), prefer

TU Munich and **LMU Munich** for their stays, along with **U Münster**, which ranks second between the two Munich universities. The ERC funded 216 researchers in the field of the natural sciences in the reporting period 2014 to 2019 (see Table 5-3). 137 of these ERC grantees were primarily working at an HEI. ERC grantees in the natural sciences preferred **LMU Munich**, **TU Munich** and **U Mainz**.

Detailed information on the number of AvH, DAAD and ERC funding recipients per HEI and non-university research institutions is to be found in the DFG Funding Atlas online supplement at www.dfg.de/fundingatlas Tables Web-27 and Web-29 to Web-31.

5.5 Funding Profiles in the Engineering Sciences

Research in the engineering sciences is considered to be particularly application-oriented and is often conducted in companies or receives financial support from them. Nonetheless, DFG funding with a focus on knowledge-driven research is in great demand in the engineering sciences, too. Just under 19% of DFG funding in the period 2017 to 2019 went to this area; in absolute figures this was just under €1.8 billion (see Table 5-13).

In the Funding Atlas, five research areas with a total of ten research fields are distinguished in the scientific discipline of the engineering sciences (see Table 5-1). The research area classification system distinguishes between mechanical and production engineering, thermal engineering/process engineering, materials science and materials engineering, computer science, systems and electrical engineering, and civil engineering and architecture.

The research field that occupies first place in terms of third-party DFG funding is computer science[12], which accounts for almost 20% of the engineering sciences' funding with a good €346 million (see Figure 5-10). Other large research fields are production technology (€259 million) and materials science (just under €208 million). As in the other scientific disciplines, the relationships be-

12 On the development of computer science in terms of DFG funding, see also DFG, 2019: 77.

Table 5-13:
Participation[1] in DFG, federal government and EU funding programmes for research by type of institution in the engineering sciences

Type of institution	DFG awards		Direct R&D project funding from the federal government		R&D funding in Horizon 2020[2]	
	€m	%	€m	%	€m	%
Higher education institutions	**1,606.7**	**90.7**	**1,633.3**	**29.5**	**431.9**	**23.7**
Non-university research institutions	**164.3**	**9.3**	**1,859.9**	**33.6**	**572.5**	**31.4**
Fraunhofer-Gesellschaft (FhG)	18.3	1.0	954.3	17.2	208.1	11.4
Helmholtz Association (HGF)	29.9	1.7	188.3	3.4	143.3	7.9
Leibniz Association (WGL)	34.0	1.9	78.1	1.4	24.3	1.3
Max Planck Society (MPG)	33.3	1.9	21.8	0.4	25.4	1.4
Federal research institutions	7.9	0.4	38.5	0.7	9.6	0.5
Other research institutions	40.7	2.3	579.0	10.5	161.7	8.9
Industry and commercial enterprises			**2,046.9**	**36.9**	**818.3**	**44.9**
Institutions overall	**1,770.9**	**100.0**	**5,540.1**	**100.0**	**1,822.7**	**100.0**

[1] Funding for German and institutional recipients only.
[2] For comparison purposes, the funding amounts for Horizon 2020 shown here have been converted to a three-year period corresponding to the years under consideration for the funding amounts provided by the DFG and the federal government. In total, the institutions under consideration here have received €3,645.4 million under the Horizon 2020 programme to date. For further methodological explanations, see the Glossary of Methodological Terms at www.dfg.de/fundingatlas.

Note: Corresponds to Tabelle 4-17 of the DFG Förderatlas 2021.

Data basis and sources:
Deutsche Forschungsgemeinschaft (DFG, German Research Foundation): DFG awards for 2017 to 2019.
EU Office of the BMBF: Participation in Horizon 2020. EU Framework Programme for Research and Innovation (project data as of 12 May 2020).
Federal Ministry for Economic Affairs and Climate Action (BMWK): Funding for the Central Innovation Programme for SMEs (ZIM) 2017 to 2019.
Federal Ministry of Education and Research (BMBF): Direct R&D project funding from the federal government 2017 to 2019 (PROFI project database).
Calculations by the DFG.

Figure 5-10:
DFG awards for 2017 to 2019 by research field in the engineering sciences

Note: Areas are proportionate to funding distribution. Figures are in millions of euros. Corresponds to Abbildung 4-10 of the DFG Förderatlas 2021.

Data basis and source:
Deutsche Forschungsgemeinschaft (DFG, German Research Foundation): DFG awards for 2017 to 2019.
Calculations by the DFG.

tween the research fields have remained very constant.

Detailed analyses of DFG funding profiles for HEIs and non-university research institutions by individual research areas and research fields as distinguished in the Voronoi presentation above are to be found in the form of tables at www.dfg.de/fundingatlas (Table Web-9 and Web-19).

Extensive Federal Government Funding in the Engineering Sciences

The engineering sciences benefit to a particular extent from federal government and EU programmes. The participations listed in Table 5-13 for these two funding sources are indeed significantly higher than in the case of the DFG, which was the funding source with the highest funding volume in each of the other three scientific disciplines, as reported above. This discipline received half of the federal government's R&D project funding, at €5.5 billion. In the period from 2017 to 2019, a good €1.8 billion of EU funding was allocated to projects and consortia in the engineering sciences (see Table 5-13). Finally, the DFG provided almost €1.8 billion in funding for the engineering sciences.

This pattern is put into perspective if we compare the extent to which the HEIs benefit from the three funding sources. Here, the federal government and the DFG are practically evenly matched with €1.6 billion each, while the EU funding volume amounts to a good quarter of this, about €432 million. Here, the distribution of funding per recipient group differs significantly from the other scientific disciplines: while the DFG achieves a very high HEI share of almost 91% in the engineering sciences, the shares for the federal government and the EU are lower, at 30% and 24% respectively. Significantly larger

shares of funds go into industry and commerce projects (37% and 45% respectively).

The Networking Profile in the Engineering Sciences Consists of Strong Technical HEIs

Figure 5-11 shows the HEIs that have acquired a particularly large number of projects in the engineering sciences under the DFG's Coordinated Programmes as well as under the Excellence Initiative and Excellence Strategy. Over 150 HEIs and research institutions were involved in consortia in the reporting period 2017 to 2019. The relationships are symbolised by lines, with the line thickness increasing to reflect a greater number of joint participations between the institutions. The number of participations per institution is shown by the diameter of the circular symbol for the institution in question (see chapter 5.2).

The engineering sciences show a very distinctive networking profile compared to the other scientific disciplines. **TH Aachen** in the west and **TU Dresden** in the east form two poles, so to speak. **TU Dresden** has striking cross-regional connections, while **TH Aachen**, in addition to its numerous cross-regional connections, also has a regional focus in the immediate vicinity – especially with **Forschungszentrum Jülich (FZJ)** – and beyond this links to many HEIs and non-university research institutions located in NRW, especially in the Ruhr region.

In the north, **U Hannover** stands out in particular with its strong links to **TU Braunschweig** and **TU Clausthal**. In the south, **TU Munich**, **U Erlangen-Nürnberg**, **KIT Karlsruhe** and **U Stuttgart** have many priority areas in the engineering sciences that involve strong cross-regional networks.

TH Aachen Clearly Leads the Ranking in the Engineering Sciences

Table 5-14 shows the 20 HEIs with the highest DFG awards in the engineering sciences, both in absolute terms and relative to staff[13]. A total of 141 HEIs received DFG awards during the reporting period. This means that alongside the humanities and social sciences, engineering is the scientific discipline with the broadest participation of HEIs. As in the last reporting period (DFG, 2019: 74), the highest funding amount in absolute terms, namely €152.5 million, was achieved by **TH Aachen**. The latter received over a third more than the next HEI, **U Stuttgart**, which itself climbed from 5th to 2nd place since to the last report, increasing its DFG funding by 26% to €100.5 million.

Following in positions 3 to 5, **TU Dresden**, **U Erlangen-Nürnberg** and **TU Darmstadt** acquired funding amounts between €91 and €98 million. These five universities also made up the top five in 2018, albeit in a slightly different order.

U Erlangen-Nürnberg Ahead Relative to Number of Professors

Relative to the number of professors, **U Erlangen-Nürnberg** achieved the highest amount of DFG funding, followed by **TH Aachen**, making both locations highly visible both in absolute terms and adjusted for staff size. **U Hannover**, **U Bochum** and **U Bremen** have somewhat greater visibility here too, however. When adjusted for the total number of academic staff, the small aforementioned **U Oldenburg** leads the field. In addition to **U Erlangen-Nürnberg**, which is placed second, other HEIs are also represented here that do not otherwise appear in to the top ten in the engineering sciences, such as **U Bremen** and **U Kiel**.

DAAD, AvH and ERC Funding Recipients by HEI

TU Munich and **TU Berlin** are particularly attractive to the target group of international researchers insofar as funding is provided by the AvH (see Table 5-15). Following them, with roughly the same number of guest researchers, are **U Erlangen-Nürnberg**, **TU Darmstadt** and **KIT Karlsruhe**. The latter leads the ranking in terms of DAAD-funded guest academics; the differences in the number of DAAD-funded guest researchers are minimal (48, 47 and 46 guests) between the first three places, which also include **TH Aachen** and **TU Berlin**. All in all, the number of people funded by the AvH in the engineering sciences increased slightly (by 7.5%) compared to the five-year period from

13 See also the Glossary of Methodological Terms under "HEI staff" at www.dfg.de/fundingatlas.

Figure 5-11:
Participations by research institutions in DFG-funded Coordinated Programmes and resulting cooperative relationships 2017 to 2019 in the engineering sciences

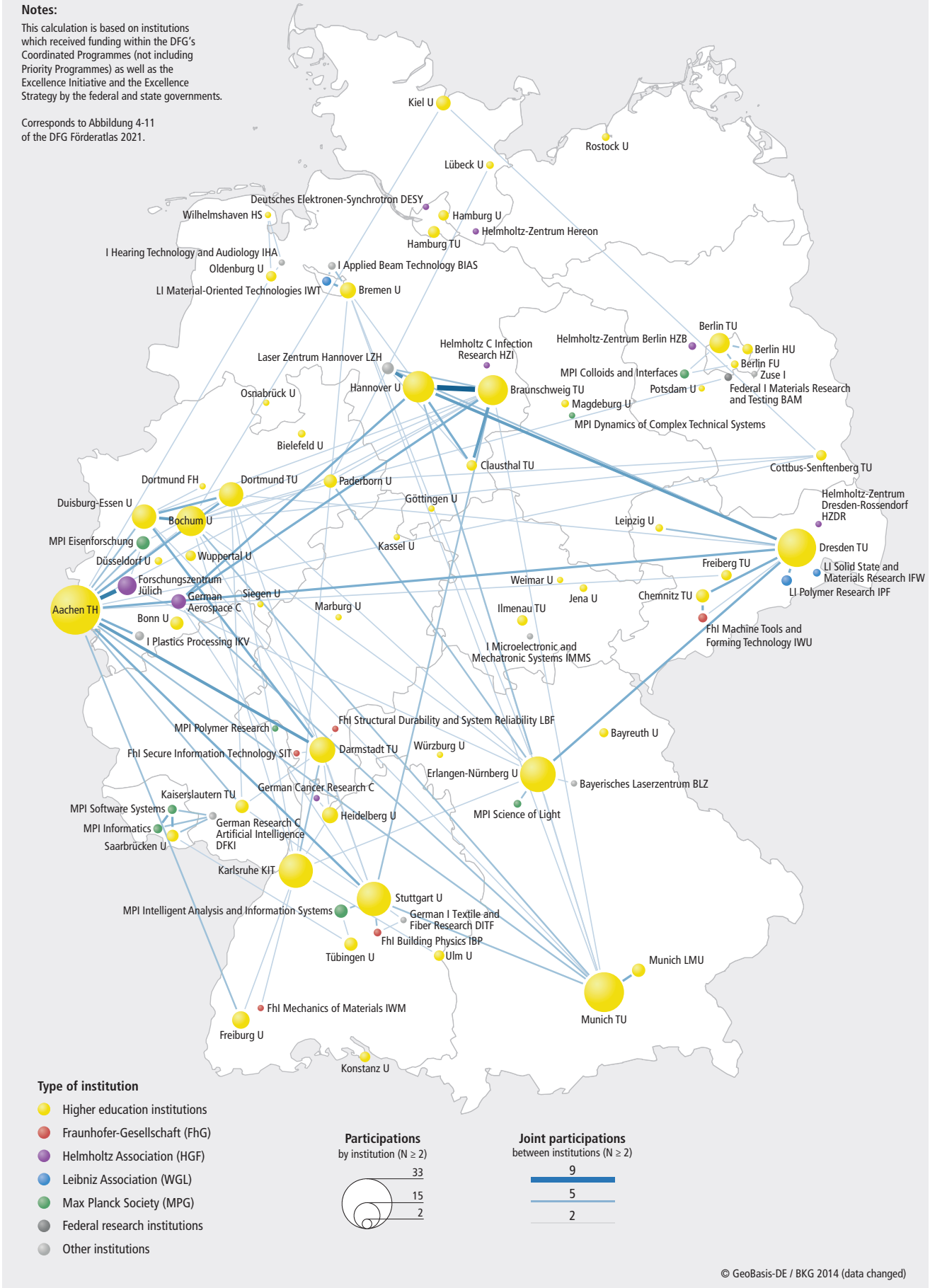


Table 5-14:
The higher education institutions with the highest DFG awards for 2017 to 2019 in absolute figures and relative to staff size in the engineering sciences

DFG awards (absolute)		DFG awards relative to staff size[1]					
Higher education institution	Total	Higher education institution	Professorial staff		Higher education institution	Researchers	
	€m		N	€ thousand per prof.		N	€ thousand per res.
Aachen TH	152.5	Erlangen-Nürnberg U	100	928.8	Oldenburg U	124	94.6
Stuttgart U	100.5	Aachen TH	169	904.3	Erlangen-Nürnberg U	1,352	68.7
Dresden TU	97.9	Hannover U	89	846.9	Bremen U	590	66.4
Erlangen-Nürnberg U	92.9	Bochum U	67	798.1	Kiel U	309	66.2
Darmstadt TU	91.2	Bremen U	57	691.0	Bochum U	842	64.0
Karlsruhe KIT	82.5	Freiburg U	42	681.6	Hannover U	1,205	62.7
Munich TU	78.0	Stuttgart U	148	678.8	Freiburg U	461	62.5
Hannover U	75.6	Freiberg TU	45	656.3	Saarbrücken U	340	59.8
Berlin TU	58.7	Dresden TU	151	647.7	Bielefeld U	209	58.8
Bochum U	53.8	Darmstadt TU	145	628.8	Bonn U	166	56.2
Braunschweig TU	50.8	Karlsruhe KIT	137	601.0	Darmstadt TU	1,643	55.5
Dortmund TU	49.9	Kiel U	36	562.4	Ulm U	278	53.8
Bremen U	39.2	Chemnitz TU	51	558.4	Dortmund TU	935	53.3
Duisburg-Essen U	39.0	Dortmund TU	101	495.0	Jena U	152	53.0
Hamburg TU	29.7	Paderborn U	53	492.3	Duisburg-Essen U	767	50.9
Freiberg TU	29.5	Bayreuth U	27	489.5	Karlsruhe KIT	1,729	47.7
Kaiserslautern TU	29.2	Duisburg-Essen U	82	478.0	Aachen TH	3,252	46.9
Freiburg U	28.8	Braunschweig TU	107	475.3	Paderborn U	555	46.9
Chemnitz TU	28.2	Saarbrücken U	45	450.2	Hamburg TU	653	45.4
Paderborn U	26.0	Bonn U	21	449.7	Berlin FU	109	44.4
Ranked 1–20	**1,233.9**	**Ranked 1–20**	**1,673**	**737.7**	**Ranked 1–20**	**15,671**	**78.7**
Other HEIs[2]	**372.7**	**Other HEIs[2]**	**10,691**	**34.9**	**Other HEIs[2]**	**39,027**	**9.6**
HEIs overall	**1,606.7**	**HEIs overall**	**12,363**	**130.0**	**HEIs overall**	**54,698**	**29.4**
of which: universities	**1,586.9**	**of which: universities**	**3,631**	**437.0**	**of which: universities**	**36,934**	**43.0**
Based on: N HEIs	**141**	**Based on: N HEIs**	**227**	**132**	**Based on: N HEIs**	**238**	**132**

[1] Only HEIs which employed more than 20 professors or 100 or more researchers in the scientific discipline under consideration during 2018 were included within the scope of this calculation.
[2] Please see Tables Web-6 and Web-11 at www.dfg.de/fundingatlas for data on other higher education institutions.

Note: Corresponds to Tabelle 4-18 of the DFG Förderatlas 2021.

Data basis and sources:
Deutsche Forschungsgemeinschaft (DFG, German Research Foundation): DFG awards for 2017 to 2019.
Federal Statistical Office (Destatis): Education and Culture. Personnel at Higher Education Institutions 2018. Special analysis of Subject-Matter Series 11, Series 4.4.
Calculations by the DFG.

2012 to 2016, while the number of DAAD funding recipients dropped slightly (by 6%).

In the engineering sciences, exactly 137 internationally renowned researchers acquired funds to carry out an ERC-funded project at a German higher education institution between 2015 and 2019, while a further 33 chose a non-university institution. **TU Munich** also enjoys a high reputation among ERC funding recipients, clearly leading the ranking based on the number of ERC engineering scientists working there. In this scientific discipline in particular, note there is a very broad distribution: a total of 40 HEIs were chosen by ERC grantees to carry out a project in the engineering sciences.

Detailed information on the number of AvH, DAAD and ERC funding recipients per HEI and non-university research institutions is to be found in the DFG Funding Atlas online supplement at www.dfg.de/fundingatlas Tables Web-27 and Web-29 to Web-31.

Table 5-15:
The most frequently selected host universities by AvH, DAAD and ERC funding recipients in the engineering sciences

AvH funding recipients		DAAD funding recipients		ERC funding recipients	
Higher education institution	N	**Higher education institution**	N	**Higher education institution**	N
Munich TU	62	Karlsruhe KIT	48	Munich TU	16
Berlin TU	43	Aachen TH	47	Darmstadt TU	9
Erlangen-Nürnberg U	35	Berlin TU	46	Aachen TH	8
Darmstadt TU	34	Dresden TU	39	Münster U	7
Karlsruhe KIT	32	Munich TU	34	Freiburg U	6
Aachen TH	28	Hannover U	32	Munich LMU	6
Stuttgart U	27	Stuttgart U	30	Saarbrücken U	6
Duisburg-Essen U	26	Darmstadt TU	22	Dresden TU	5
Dresden TU	25	Freiberg TU	20	Erlangen-Nürnberg U	5
Bochum U	24	Weimar U	20	Hannover U	5
Hannover U	24	Magdeburg U	19	Berlin TU	4
Hamburg TU	14	Erlangen-Nürnberg U	14	Bochum U	4
Bremen U	11	Ilmenau TU	14	Tübingen U	4
Hamburg U	11	Bochum U	13	Berlin FU	3
Braunschweig TU	9	Braunschweig TU	13	Berlin HU	3
Magdeburg U	9	Dortmund TU	13	Bonn U	3
Siegen U	9	Chemnitz TU	9	Hamburg U	3
Dortmund TU	8	Siegen U	9	Kaiserslautern TU	3
Kaiserslautern TU	8	Cottbus-Senftenberg TU	8	Konstanz U	3
Münster U	8	Kaiserslautern TU	8	Regensburg U	3
Saarbrücken U	8			Stuttgart U	3
				Würzburg U	3
Ranked 1–18	**455**	**Ranked 1–19**	**458**	**Ranked 1–14**	**111**
Other HEIs[1)]	**139**	**Other HEIs[1)]**	**85**	**Other HEIs[1)]**	**26**
HEIs overall	**594**	**HEIs overall**	**543**	**HEIs overall**	**137**
Based on: N HEIs	**71**	**Based on: N HEIs**	**48**	**Based on: N HEIs**	**40**

[1)] Please see Tables Web-27, Web-29 and Web-30 at www.dfg.de/fundingatlas for data on other higher education institutions.

Note: Corresponds to Tabelle 4-20 of the DFG Förderatlas 2021.

Data basis and sources:
Alexander von Humboldt Foundation (AvH): Research visits by AvH guest researchers from 2015 to 2019.
EU Office of the BMBF: ERC funding 2014 to 2019 in Horizon 2020. EU Framework Programme for Research and Innovation (project data as of 12 May 2020). Figures include Starting Grants, Advanced Grants and Consolidator Grants.
German Academic Exchange Service (DAAD): Research visits by DAAD guest researchers 2015 to 2019.
Calculations by the DFG.

6 Appendix

Bibliography

Alexander von Humboldt-Stiftung (AvH) (2020): Jahresbericht 2019. Bonn (www.humboldt-foundation.de/fileadmin/Entdecken/Zahlen_und_Statistiken/Finanzen_und_Jahresberichte/jahresbericht_2019.pdf).

Bundesministerium für Bildung und Forschung (BMBF) (2016): Bundesbericht Forschung und Innovation 2016. Forschungs- und innovationspolitische Ziele und Maßnahmen der Bundesregierung. Bonn – Berlin (www.bundesbericht-forschung-innovation.de/ files/Publikation-bmbf_bufi_2016_hauptband_ barrierefrei.pdf).

Deutsche Forschungsgemeinschaft (DFG) (2012): Förderatlas 2012. Kennzahlen zur öffentlich finanzierten Forschung in Deutschland. Bonn (www.dfg.de/download/pdf/dfg_im_profil/zahlen_fakten/foerderatlas/2012/dfg-foerderatlas_2012.pdf).

Deutsche Forschungsgemeinschaft (DFG) (2016): Funding Atlas 2015. Key Indicators for Publicly Funded Research in Germany. Bonn (https://www.dfg.de/download/pdf/dfg_im_profil/zahlen_fakten/foerderatlas/2015/dfg_fundingatlas_2015.pdf).

Deutsche Forschungsgemeinschaft (DFG) (2018a): Förderatlas 2018. Kennzahlen zur öffentlich finanzierten Forschung in Deutschland. Bonn (www.dfg.de/download/pdf/dfg_im_profil/zahlen_fakten/foerderatlas/2018/dfg_foerderatlas_2018.pdf).

Deutsche Forschungsgemeinschaft (DFG) (2018b): Das Begutachtungswesen der DFG – Trends und Analysen. Bonn (https://doi.org/10.5281/zenodo.1475874).

Deutsche Forschungsgemeinschaft (DFG) (2019): Funding Atlas 2018. Key Indicators for Publicly Funded Research in Germany. Bonn (https://www.dfg.de/download/pdf/dfg_im_profil/zahlen_fakten/foerderatlas/2018/dfg_fundingatlas_2018.pdf).

Deutsche Forschungsgemeinschaft (DFG) (2020): Jahresbericht 2019 – Aufgaben und Ergebnisse. Bonn.

Deutsche Forschungsgemeinschaft (DFG) (2021): Satzung der Deutschen Forschungsgemeinschaft. Bonn (www.dfg.de/download/pdf/dfg_im_profil/geschaefts-stelle/publikationen/dfg_satzung_de_en.pdf).

Deutscher Akademischer Austauschdienst (DAAD) (2020): Jahresbericht 2019. Bonn (https://static.daad.de/media/daad_de/pdfs_nicht_barrierefrei/der-daad/daad_jahresbericht_2019.pdf).

European Commission (2010): Communication from the Commission. Europe 2020. A strategy for smart, sustainable and inclusive growth. Brüssel (https://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf).

Flachowsky, S. (2005): Der Bevoll-mächtigte für Hochfrequenzforschung des Reichsforschungsrates und die Organisation der deutschen Radarforschung in der Endphase des Zweiten Weltkrieges 1942–1945. In: Technikgeschichte, 72(3): 203–226.

Gemeinsame Wissenschaftskonferenz (GWK) (2016): Bekanntmachung der Verwaltungsvereinbarung zwischen Bund und Ländern gemäß Artikel 91b Absatz 1 des Grundgesetzes zur Förderung von Spitzenforschung an Universitäten – „Exzellenzstrategie“. Bonn (http://www.gwk-bonn.de/fileadmin/Redaktion/Dokumente/Papers/Verwaltungsvereinbarung-Exzellenzstrategie-2016.pdf).

Gemeinsame Wissenschaftskonferenz (GWK) (2020a): Pakt für Forschung und Innovation. Monitoring-Bericht 2020. **Bonn** (https://www.gwk-bonn.de/fileadmin/Redaktion/Dokumente/Papers/GWK-Heft-68_Monitoring-Bericht-2020-Band_I.pdf).

Gemeinsame Wissenschaftskonferenz (GWK) (2020b): Steigerung des Anteils der FuE-Ausgaben am nationalen Bruttoinlandsprodukt (BIP) als Teilziel der Strategie Europa 2020. Bonn (http://www.gwk-bonn.de/fileadmin/Redaktion/Dokumente/Papers/Sachstandsbericht_2020_Heft_72_final_Homepage.pdf).

Grüttner, M., Kinas, S. (2007): Die Vertreibung von Wissenschaftlern aus den deutschen Universitäten 1933–1945. In: Vierteljahrshefte für Zeitgeschichte, 55(1): 123–186.

Hachtmann, R. (2009): „Rauher Krieg" und „friedliche Forschung"? Zur Militari-sierung der Wissenschaften und zur Verwissenschaftlichung des Krieges im 19. und 20. Jahrhundert. In: Berg, M., Thiel, J., Walter, P. Th. (Hrsg.): Mit Feder und Schwert. Militär und Wissenschaft – Wissenschaftler im Krieg: 25–55. Stuttgart.

Henning, E., Kazemi, M. (2016): Handbuch zur Institutsgeschichte der KaiserWilhelm-/Max-Planck-Gesellschaft zur Förderung der Wissenschaften 1911–2011, Max-Planck-Gesellschaft.

Macrakis, K. (1993): Surviving the Swastika: Scientific Research in Nazi Germany. New York.

Wagner, P. (2021): Notgemeinschaften der Wissenschaft. Die Deutsche Forschungsgemeinschaft (DFG) in drei politischen Systemen, 1920 bis 1973. Studien zur Geschichte der Deutschen Forschungsgemeinschaft, Band 12. Stuttgart.

Data Basis and Sources

Alexander von Humboldt Foundation (AvH): Research visits by AvH guest researchers from 2015 to 2019.

Deutsche Forschungsgemeinschaft (DFG): DFG awards for 2017 to 2019; participations in Coordinated Programmes (Collaborative Research Centres, Research Units, DFG Research Centres), in the Excellence Initiative and the Excellence Strategy by the German federal and state governments 2017 to 2019.

Deutsche Forschungsgemeinschaft (DFG): GEPRIS Historisch – Research Funding 1920 to 1945 (https://gepris-historisch.dfg.de/).

EU Office of the BMBF: Participation on Horizon 2020. The EU's Framework Programme (project data as of 12 May 2020). European Research Council (ERC) funding (project data as of 12 May 2020) including Staring Grants, Advanced Grants and Consolidator Grants.

Federal Ministry for Economic Affairs and Climate Action (BMWK): Funding for the Central Innovation Program for SME (ZIM) from 2017 to 2019.

Federal Ministry of Education and Research (BMBF): Direct R&D project funding by the federal government 2017 to 2019 (project database PROFI), Federal Government Report on Research and Innovation 2020.

Federal Statistical Office (Destatis): For HEIs, the current basic funds and third-party funding 2010–2019, scientific and artistic personnel working full-time, and income of HEIs and non-university research institutions 2018 and 2019.

German Academic Exchange Service (DAAD): Funding for researchers as well as students and graduates from abroad from 2015 to 2019.

German Federation of Industrial Research Associations (AiF): Funding for Industrial Collective Research (IGF) from 2017 to 2019.

Organisation for Economic Co-operation and Development (OECD): Main Science and Technology Indicators 2021. As of 1 June 2021.

UNESCO Institute for Statistics (UIS): Gross domestic expenditure on R&D (GERD) in current purchasing power parities (PPP). As of March 2021.

Index of Abbreviations

General Abbreviations

BW	Baden-Württemberg
C	Centre
CRC	Collaborative Research Centres
DE	Germany
ExStra	Excellence Strategy
e.V.	Registered Association
FET	Future and Emerging Technologies
FH	University of applied sciences
GDP	Gross domestic product
GEPRIS	German Project Information System
GERD	Gross domestic expenditure on R&D
GERiT	German Research Institutions
GG	Basic Law
GmbH	Gesellschaft mit beschränkter Haftung (private limited company, Ltd.)
GND	Gemeinsame Normdatei (Integrated Authority File)
HAW	University of applied sciences
HEI	Higher education institution
I	Institute
INRA	Institut national de la recherche agronomique
INSERM	Institut national de la santé et de la recherche médicale
IGF	Industrial Collective Research
MSCA	Marie-Skłodowska-Curie-Actions
NFDI	National Research Data Infrastructure
PFI	Joint Initiative for Research and Innovation
Postdoc	Postdoctoral researcher
prof.	Professor
PROFI	Project-funding information system of the federal government
R&D	Research and development
res.	Researcher
ROR	Spatial development regions
SME	Small and medium-sized enterprises
STEM	Science, Technology, Engineering, Maths
TU/TH	Technical University
U	University
UK	United Kingdom
USA	United States of America
ZIM	Central Innovation Programme for SME

Institutions and Organisations

AiF	German Federation of Industrial Research Associations
AvH	Alexander von Humboldt Foundation
BBSR	Federal Institute for Research on Building, Urban Affairs and Spatial Development
BKG	Federal Agency for Cartography and Geodesy
BMBF	Federal Ministry of Education and Research
BMEL	Federal Ministry of Food and Agriculture
BMJ	Federal Ministry of Justice
BMUV	Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection
BMVI	Federal Ministry of Transport and Digital Infrastructure
BMWi	Federal Ministry for Economic Affairs and Energy
BMZ	Federal Ministry for Economic Cooperation and Development
CNRS	Centre national de la recherche scientifique
DAAD	German Academic Exchange Service
Destatis	Federal Statistical Office
DFG	Deutsche Forschungsgemeinschaft (German Research Foundation)
DLR	German Aerospace Center
ERC	European Research Council
EU	European Union
FhG	Fraunhofer-Gesellschaft
FhI	Fraunhofer Institute
GWK	Joint Science Conference
HGF	Helmholtz Association of National Research Centres
HRK	German Rectors' Conference
KWG	Kaiser Wilhelm Society for the Advancement of Science
MFT	German Medical Faculty Association
MPG	Max Planck Society
MPI	Max Planck Institute
OECD	Organisation for Economic Cooperation and Development
RFR	Reich Research Council
UIS	UNESCO Institute for Statistics

UNESCO	United Nations Educational, Scientific and Cultural Organization
WGL	Gottfried Wilhelm Leibniz Association of Science
WR	German Council of Science and Humanities

Deutsche Forschungsgemeinschaft
Kennedyallee 40 · 53175 Bonn
Postanschrift: 53170 Bonn
Telefon: +49 228 885-1
Telefax: +49 228 885-2777
postmaster@dfg.de
www.dfg.de