

R&D Landscape

Rising R&D Expenditure

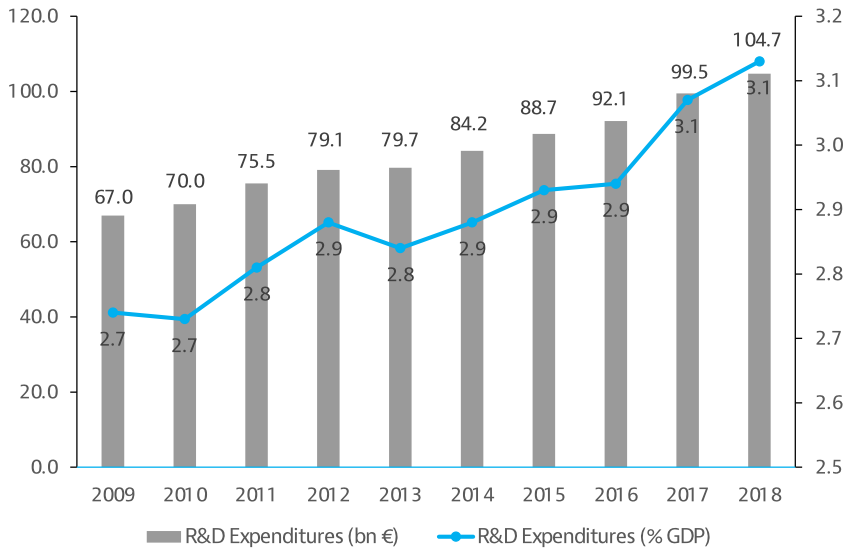
In Germany, enormous sums are invested in the development of new technologies and innovations. No other country in Europe invests a greater amount in research and development (R&D). For more than a decade, Germany's R&D expenditures have been rising constantly.

In 2018, public and private spending on research projects in Germany amounted to approximately EUR 104.7 billion – representing 3.1 % of Gross Domestic Product (GDP). This share places Germany third in Europe, behind Sweden and Austria, but significantly ahead of France and the United Kingdom and the EU-average.

This means that Germany has already achieved the 3 percent goal specified by the European Union. More than two thirds of the expenditure are funds provided by research intensive private enterprises.

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R&D Expenditures in Germany (2009-2018)



Source: Eurostat 2020, GTAI Calculations.
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Einstein's Heirs

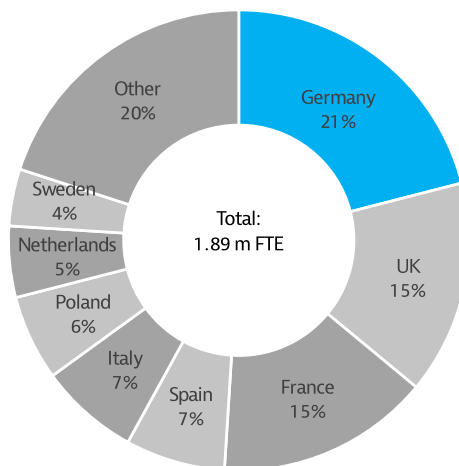
The strong research location of Germany has always contributed to the emergence of important world-class scientists. Albert Einstein's career started in Germany and culminated in the award of the Nobel Prize in Physics in 1921. However, the continuity of Germany's research quality is not only underlined by Max Planck and Robert Koch, but also by the

two last Nobel Prize Winners, Thomas C. Südhof (2013) and Harald zur Hausen (2008): more than 80 Nobel Prizes in medicine and the natural sciences were awarded to Germans.

Germany is home of the biggest research community in Europe – 21 percent of the scientists in the EU live and work here. Moreover, German researchers cooperate in projects all over the world. For example, the Max-Planck-Gesellschaft currently cooperates with scientists in more than 110 countries.

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Researchers in the EU (2018)



Note: FTE = Full Time Equivalent.
Source: Eurostat 2020.

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Proven Transfer of Knowledge

Germany's R&D landscape is characterized by a close cooperation between science and economy. It is based on the dense and decentralized network of more than 400 universities and technical colleges. But the availability of highly qualified university graduates all over Germany is not the only thing it ensures.

Also the private industry uses these valuable opportunities for cooperation and the access channels to fundamental and applied research at the universities. The findings of the work performed there are effectively used for industrial implementation. Scientists can easily be integrated into the corporate teams of developers and researchers. In addition, laboratory equipment is increasingly made available by the institutes.

Germany even made significant progress in formal technology transfer over the last years. This includes the patent exploitation offices established since 2001 enabling a commercialization of results subject to property rights created in

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the universities and their transfer to the industry. And, research institutes outside the university have their own exploitation bodies.

- [SIGNO - Protection of Intellectual Property \(in German only\)](#) 

Thus, it is not surprising that international decision makers praise the knowledge transfer between companies and universities in Germany.

Renowned Research Institutes

In a worldwide comparison, Germany holds a unique position thanks to its publicly subsidized research communities outside the universities.

The application-oriented research communities, Fraunhofer-Gesellschaft and Leibniz-Gemeinschaft, provide mainly small and medium-sized companies with access to top research. Fraunhofer-Gesellschaft invests EUR 2.6 billion of R&D funds in its more than 72 facilities and over 26,600 employees. A major part of these funds is generated by contractual research in collaboration with the industry.

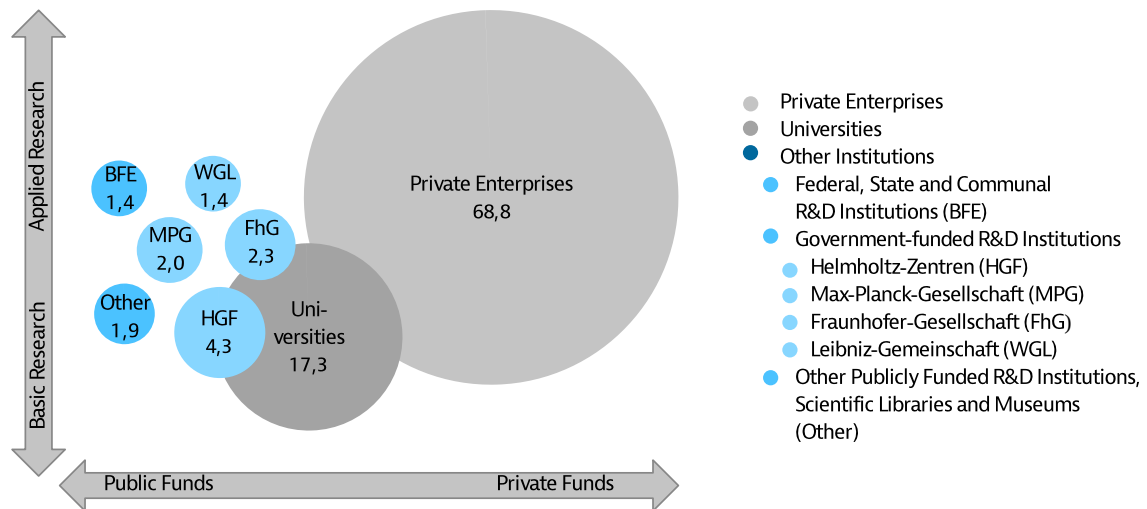
Leibniz-Gemeinschaft's network comprises 93 institutes and almost 19,700 employees. Renowned institutes for fundamental research are located in Germany as well. Max-Planck-Gesellschaft and Helmholtz-Gemeinschaft enable companies to outsource costly fundamental research, thus reducing the risk associated with the development of new products and decreasing the amount of R&D expenditures.

- [Maps of Research Institutes](#) 

The interaction between universities, research organizations, industrial research and other entities constitutes a division of labor in the creation of value-added new knowledge which is unique in the world. This differentiated performance of tasks by the institutes involved covers the entire range from pre-competitive fundamental research mostly supported by the public sector up to tradeable application research financed by the industry.

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R&D-Expenditures by Source and Intended Use (bn €, 2017)



Source: Statistisches Bundesamt 2020.

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Effective Networks of Competency

Germany is characterized by an advanced structure of highly innovative regional networks and clusters providing companies with excellent access to knowledge, technologies and value chains. Interactive research and learning processes ensure a faster diffusion of technology, including a subsequent introduction in the market.

A special quality seal is the membership in the “go-cluster” initiative of the Federal Ministry of Economic Affairs and Energy. This initiative includes already about 100 clusters that meet strong criteria for membership. Admission depends on the level of cooperation between industry and science. This includes the extent to which a potential member is actively dedicated to innovation. Additionally, the “go-cluster” membership facilitates access to funds for the development of special cluster services.

- [go-cluster](#)

Cooperative community research is also taking place in the research networks of the industry-funded “Arbeitsgemeinschaft industrieller Forschungsvereinigungen (AiF – Work Group of Industrial Research Associations).” More than 50,000 small and medium-sized companies have organized approx. 100 consortiums and perform research projects relevant for specific spheres of technology. It facilitates the search for partners and the access to university networks and helps to overcome structure-based disadvantages of SMEs in the field of R&D.

- [AiF - German Federation of Industrial Research Associations](#)

Leading Reform Initiatives

In shaping the knowledge-based society, the Federal Government and the Federal States of Germany have set the course to master the challenges that arise from an intense global competition for innovation.

Among the various funding programs initiated, the Excellence Strategy aimed at strengthening cutting-edge research at universities is of special importance.

Two funding lines must be differentiated: Clusters of Excellence and Universities of Excellence.

The Clusters of Excellence funding line provides project-based funding in internationally competitive fields of research at individual universities or university alliances. The Clusters of Excellence involve researchers from various disciplines and institutions working in a collaborative project. The funding provides them with the opportunity of focusing intensively on their research objective, training young scientists and recruiting highly qualified international researchers. Clusters of Excellence receive funding for a period of seven years. A second funding period of another seven years is possible.

The Universities of Excellence funding line sets out to strengthen universities or university alliances as institutions and to expand their leading international position in research on the basis of successful Clusters of Excellence. Universities must therefore already have at least two Clusters of Excellence – and in the case of university alliances at least three Clusters of Excellence – in order to be eligible to apply for the status of University of Excellence. Universities of Excellence receive permanent funding but have to submit to a review of the prerequisites for funding every seven years. This means that Universities of Excellence have to regularly participate in the competition for the funding of the necessary number of Clusters of Excellence by submitting new applications every seven years.

- [Excellence Strategy](#) 

Besides, two other programs must be mentioned: the Pact for Innovation and Research, aimed at strengthening major non-university research institutions as well as the Deutsche Forschungsgemeinschaft (DFG), and the Teaching Quality Pact, concerned with improving the quality of education at higher training institutions.

Contact Us

Thomas Bozoyan

 +49 30 200 099 502

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