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Funding programme for applied research

HRK German Rectors' Conference

The Voice of the Universities

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The role of the universities in the German innovation system

Prosperity and quality of living in Germany are dependent on a high standard of education, research and innovation. Digitalisation and globalisation are changing and accelerating innovation processes worldwide. Faced with this strong momentum, Germany can only maintain its position successfully with its innovative products and processes by investing more in research and development (R&D). The Federal Government has therefore undertaken to increase expenditure for this area to 3.5 per cent of the Gross Domestic Product (GDP) by 2025 and is continuing to systematically develop its high-tech strategy.[1]

Particular attention must be paid to the universities in this process. They alone perform research across all disciplines, from the basics to application; they educate the experts and managers for industry and society – and hence the "innovators of tomorrow". They bring new applications to market in many different ways – from research cooperation projects to spin-offs. This makes the universities the indispensable knowledge generators without which innovation ecosystems quickly fall into decline. They are the centre of gravity of the German innovation system, combining research teaching and knowledge and technology transfer under one roof and representing all three sides of the knowledge triangle – education, research and innovation.[2] They stand for top-level research and widely disseminate their scientific knowledge. Through this transfer[3], they make a significant contribution to strengthening national, regional and local innovation capacities.

Funding of applied research and transfer at the universities

Translating research results into practical applications – including by means of cooperation arrangements with partners from industry, politics and administration as well as culture, the arts and civil society – is one of the universities' missions which, along with research and teaching, is enshrined in state law. However, universities are unfortunately not adequately funded for this remit in the basic budget. They are largely reliant on furthering their applied research and development (R&D) and transfer activities via competitive programmes and processes.

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[1] CDU, CSU and SPD (2018): Coalition Agreement 19th legislative period, p. 12; Federal Government (2018): Forschung und Innovation für die Menschen. Die Hightech-Strategie 2025 (Research and innovation for the people. The high-tech strategy 2025).

[2] Cf. German Rectors' Conference (2017): Transfer and cooperation as tasks of the Universities. Resolution of the HRK General Assembly dated 14.11.2017.

[3] Transfer is used here in the broad sense. Cf. German Rectors' Conference (2017): Transfer and cooperation as tasks of the Universities. Resolution of the HRK General Assembly dated 14.11.2017, p. 2; German Council of Science and Humanities (2016): Wissens- und Technologietransfer als Gegenstand institutioneller Strategien (Knowledge and technology transfer as an element of institutional strategies). Position paper, p. 7.

In principle, the Federal and State Governments have developed a complex funding system[4] for these needs that is to be further supplemented during this legislative period by an agency for disruptive innovation, amongst other measures. From the perspective of the universities, however, there is still a funding gap in applied research that needs to be closed by way of ongoing, bottom-up innovation funding.

Funding deficit for applied research and transfer

The creative potential of scientists in applied research could be significantly better used than is possible under current conditions. At present, researchers have very limited opportunities to advance their own ideas on how to apply their work independently of external targets. However, it is precisely such a flexible investigative process that is particularly suited to achieving surprising results, which can also extend beyond the original goal and therefore have special potential to change the market.

To date, funding of applied research projects has primarily been oriented towards demand from industry, and less towards new and innovative fields of investigation from the scientific perspective. This is illustrated by the Zentralem Innovationsprogramm Mittelstand (Central Innovation Programme for SMEs, ZIM) and Industrielle Gemeinschaftsforschung (Collaborative Industrial Research, IGF), for example. When funding offers are primarily open to scientists – in the specialist programmes of the Federal Ministry of Education and Research (BMBF), for example, they are frequently subject to government control and hence shifting thematic focuses. In addition, flexible applications by individual scientists on a case by case basis are scarcely possible, since practice partners must generally be involved from the outset.[5] This system results in considerable innovation potential remaining untapped, because promising applied research topics cannot be investigated. This holds true particularly for subject areas that have not been considered. For want of appropriate funding options, applied research topics must then be modified in such a way that they can either be investigated within the framework of funding programmes oriented towards basic research, or, at a stage that is actually too early, a practice partner must be found with very specific interests of their own.

However, the direct participation of specific practice partners and a close tie to their interests are not always expedient, especially in an early phase of the innovation process. A premature focus on users can mean that researchers lose sight of additional potential fields of application all too soon. Furthermore, in many areas – such as digitalisation – for the sake of Germany's international standing as a

[4] An overview of existing funding programmes is provided in the Appendix.

[5] Exceptions are VIP+ funding from the BMBF and "Knowledge Transfer" funding from the Deutsche Forschungsgemeinschaft (German Research Foundation, DFG). However the latter presupposes that the scientific knowledge to be transferred into applications has primarily been acquired in the course of a DFG-funded research project.

location for research and business, innovations should not only benefit individual users but should be widely disseminated. This is also an essential function of universities – and, in particular, those with a more regional orientation or those located away from the major cities. They are already frequently centres of regional innovation systems, a hub of knowledge-based innovative ideas.

Moreover, many players outside research, such as small businesses or social institutions, can only participate in research and development if the financial risk becomes manageable. This problem is not limited to completely new developments, because it is rare indeed for innovation processes to be straightforward. On the contrary, they require iterative phases of research and validation. This means that science continually faces challenges and must very often deliver its services in advance to prepare the ground for broad-scale innovation.

The proposed agency for funding disruptive innovations will also be dependent on these advance services. The agency is intended to identify and connect research results that have the potential to produce ground-breaking innovations on the market. To that end, the agency's innovation managers who oversee the process must identify sufficient research concepts – including those of a competing nature – to be in a position to build up the desired diversified portfolio in the first place. Furthermore, despite the proposed high degree of budgetary freedom, it must be possible for the at times considerable use of resources to take place with an acceptable level of risk. For this reason, the success of the agency will critically depend on specific application prospects already having been brought within reach by the researchers, and on the reservoir of innovation ideas being continuously topped up.

Even after this expansion, innovation opportunities will still fall by the wayside in the German research system if applied research at the universities is not strengthened. This is because, just as previously, potentially innovative research concepts may not even be pursued due to the specific interests of practice, and efficiency suffers if research projects have to be redesigned because of a lack of funding formats. The universities therefore propose closing the gap described above in the German funding system with a new funding line with the following cornerstones.

Cornerstones and institutional framework of the new funding

The following elements need to be considered:

1. The funding will enable research projects with relevance for applications and transfer.
2. Funding will not be tied to topics or disciplines, will be available for an extended period and will hence allow for a flexible response to new developments.
3. It will be possible to submit a proposal at any time, i.e. without a separate call for proposals.
4. Professors will be entitled to submit proposals. Funding will be awarded according to the bottom-up principle.
5. Cooperation with practice partners as part of a project will be possible but is not required for a proposal.

6. The scientific and social/industry relevance of the projects must be made clear when applying for funding.
7. The selection of the projects will be performed on principle of merit in a special review process by scientists with qualifications in the subject and also by distinguished experts from practice. In this way, the process will satisfy scientific requirements, ensure the exceptional quality of projects and at the same time take appropriate account of the potential for application/monetarisation.[6]

In order to be capable of stimulating substantial innovation, overall the funding must be on a longer-term basis and be adequately resourced. It is only after several years that a valid assessment can be made of how the funded applied research has contributed to momentum in the innovation scene in industry and society. For this reason, an appropriate funding line, based in the Federal Ministry of Education and Research, should have an initial term of at least five, and up to ten, years. After the conclusion of such an initial phase with an evaluation, the institutional ties of the funding should also be scrutinised. The goal here over the long term must be to provide the funding with the institutional setting that can best combine the funding elements specified in a sustained manner. In order to achieve optimal broad-based effectiveness in industry and society and to satisfy the high demand anticipated from science, the funding line should be resourced with at least 500 million euros annually, even in its initial phase.

[6] Innosuisse, the Swiss agency for innovation funding, provides an example of this type of review process.

Appendix

Overview of existing funding programmes

The Deutsche Forschungsgemeinschaft (German Research Foundation, DFG) is an organisation that offers individual funding options for every individual researcher through its ongoing, bottom-up funding activities, particularly in the field of basic research, and through processes tailored to the needs of science. In projects funded by the DFG, the focus is essentially on the contribution to knowledge of a research endeavour assessed by the expert academic community, with applications or prospects for monetarisation taking second place. At present, researchers who have a particular interest in application-related problems often cannot find any funding instruments that focus on scientific requirements to the same extent. This is particularly true for newly evolving scientific fields, for example in the area of the health sciences, as well as for research that aims to facilitate social innovations.

For decades now, successful programmes have existed that are designed to strengthen cooperation between small and medium-sized enterprises in particular and universities and research institutions. The R&D collaboration projects of the Zentrales Innovationsprogramm Mittelstand (Central Innovation Programme for SMEs, ZIM) support projects jointly undertaken by SMEs and universities. Research institutions are also involved in undertaking projects within the framework of the Industrielle Gemeinschaftsforschung (Collaborative Industrial Research Programme, IGF). These programmes, which fall within the responsibility of the Arbeitsgemeinschaft industrieller Forschungsvereinigungen (Federation of Industrial Cooperative Research Associations, AiF) with funding from the Federal Ministry for Economic Affairs and Energy (BMWi), focus primarily on (pre-competitive) needs of industry. Universities are involved here as important partners, but not, however, as initiators. In contrast, the specialist programmes of the Federal Ministry of Education and Research (BMBF) are targeted equally or primarily at science.

The programme funding of the BMBF extends both to basic research and applied research and transfer. The precise shape of the programme is tailored to the specific requirement that was identified in the policy making process for certain research subjects, for example health research or the future of work. To succeed in applying for funding, scientists, universities and research institutions must align their research interests with the funding objectives of the particular call for proposals.

There are also Federal Government initiatives that temporarily focus their attention on structures or certain institutions. One example here is the BMBF "Innovative Hochschule" (Innovative University) funding programme, which is particularly designed to strengthen small and medium-sized universities in the regional innovation system and supports the development and implementation of transfer strategies for that purpose. The funding programme "Research and development at universities of applied sciences" provides funding for applied research dependent on the type of higher education institution. Although this

programme, which has existed since 2005, was extended for a further five years in 2018, its scope was only marginally increased.[7]

Two additional funding instruments for the pre-competition phase are specifically tailored to transfer knowledge from (basic) research into applications. Their special features are that they are not tied to topics, and that proposals may be submitted at any time. The "knowledge transfer" funding from the DFG is aimed at increasing the application potential that is generated in DFG-funded research projects with a partner from industry or the public sector. The VIP+ validation funding from the BMBF supports projects that aim to systematically review and verify the feasibility, practicability and innovation potential of research results. Universities and a range of research institutions are entitled to submit proposals. The involvement of a specific practice partner is not required during the VIP+ funding. The VIP+ measure is therefore a central, if still not adequate, building block for closing a gap in German funding architecture for applied research and transfer. However, it is restricted to the validation of research results that were produced in the applicant institution. The amount of funding provided for the VIP+ measure also falls below the scope proposed here.

The German funding system is to experience an expansion from 2019 with the creation of the agency for funding disruptive innovation. According to the current state of knowledge, the agency will pursue a top-down approach, in which particularly qualified managers will play a crucial role in guiding the innovation process with the objective of generating innovations that will reshape the market. The funding proposed here, by contrast, is designed to take up and explore innovation ideas of varying scopes in a bottom-up process. This would contribute to making a broad range of innovation ideas available to the innovation managers so that they could also have recourse to alternative approaches at challenging stages. Hence the agency and the new funding line will be mutually complementary and will enable the up-scaling of successful innovation concepts from science.

[7] Therefore, the programme falls very far short of the universities' expectations. Cf. German Rectors' Conference (2018): Federal/State Government programmes: progress and setbacks for universities of applied sciences. Press release dated 20.11.2018.