

Science and innovation system: Unlocking the next level

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In just nine months, German biotech company BioNTech and US pharmaceutical group Pfizer developed and brought to market a vaccine against SARS-CoV-2. It is the fastest-developed vaccine in history and builds on decades of basic research. Germany especially has been home to research into and work on mRNA technology with public and private-sector funding for over 20 years. With the onset of the pandemic, industry and researchers – in a concerted effort with policymakers – developed a highly effective and safe vaccine that has already protected untold numbers of people. BioNTech’s success story shows the sort of supreme accomplishments that can be achieved in Germany in the face of an extreme situation. Yet what went so well here is by no means guaranteed to work in other cases. In fact, BioNTech is an exception to the rule, and precisely that exceptional status highlights deficits in the everyday operation of the German science and innovation landscape.

We need to review the experiences of the COVID-19 pandemic and draw the right conclusions for Germany. This is all about quickly onboarding lessons learned, closing gaps in the innovation system and locking-in sources of future added value. That is the only way to deliver on our responsibility to society and future generations. And it is the only way to secure and retain the flexibility we need to respond to future upheavals and challenges.

We will only succeed in tackling the major challenges – including health, sustainability, climate change, mobility, energy supplies, digitalization and nutrition – if science and industry, with the support of agile government, are able to jointly develop and apply solutions in an excellent innovation ecosystem.

To this end, we must make the German science system ready for the future. We believe in embracing innovations as opportunities and in a culture of openness to technology. Germany needs to combine substantial and reliable public funding for science and innovation with agile enabling conditions in the form of lean, fast and transparent digital processes to lastingly strengthen the country as a research location.

In all of this, science cannot be separated from ethical guiding principles and academic freedom. Academic freedom is one of Europe’s non-negotiable fundamental values. Wherever in Europe or elsewhere in the world the work of scientists is obstructed or restricted, there is a need for robust political and social defense for academic freedom.

All signatory organizations together issue this appeal to the Federal Government and the Bundesländer:

The pandemic has highlighted the importance of science and innovation to the future-readiness of our society. It has also demonstrated Germany’s huge potential in precisely this area. Let us capitalize on this and unlock the next level in our science and innovation system. It is time to make that system more agile, more ambitious and more resilient. Six focal areas are central here:

1. Prioritizing research and innovation

- Research and innovation must be made a top priority of the German government and placed in the personal charge of the new chancellor.
- The time is ripe for a Chancellery-led cabinet “innovation committee” or a similarly effective unit within the Chancellery. It is time for future-critical issues finally to be addressed and coordinated across departmental lines. This requires a body or unit that is responsible for a cross-cutting innovation strategy with clear missions and measurable targets based on them. There must be clear-cut political responsibility for implementation. Rather than picking favorites, an open-ended approach is needed that allows diverse solution paths.
- Germany must achieve the 3.5 percent target for research and development expenditure as a proportion of gross domestic product (GDP) by 2025, while making every effort to ensure that this expenditure is invested in a goal-oriented manner.

The costs of the pandemic must not be allowed to result in heavy cuts in science and research funding budgets – and especially not in basic higher education funding.

- All fields of research should fundamentally be given equal balance. Knowledge-driven research is central to societal, social, economic and technical progress. It is nevertheless necessary to improve the tools for applying the outcomes of that research.

2. Becoming faster, more decisive and more connected

- To stay at the forefront internationally, Germany must become faster at developing and using future and emerging technologies. Public procurement can make an important contribution here and procurement rules and regulations need to be made more innovation-oriented.
- Open innovation approaches and open science principles must be given greater support. It is important not to lose sight of the need for IP protection and for it to be deployed in a way that is conducive to innovation.
- Strong support must be provided for excellent and dynamic innovation ecosystems. This includes establishing and expanding international flagship research and development clusters. For small and medium-sized enterprises (SMEs), the key lies in broad-based bottom-up approaches such as the Industrial Collective Research program.
- Research and innovation policy must become far more agile. Funding programs must be adapted to new developments in a much more versatile way and implemented more rapidly. Application procedures for program funding need to be made free of bureaucratic obstacles and significantly streamlined.

3. Attracting talent and providing excellent infrastructure

- Germany must become even more attractive as a hub for research and innovation for talented people from all over the world. It is necessary to improve the enabling conditions for attracting and retaining outstanding researchers and also data and digitalization experts at all career levels.
- Diversity and equal opportunities must be promoted much more vigorously and purposefully. The COVID-19 pandemic must not be allowed to reinforce or produce inequalities. This demand is directed not only at the legislative and executive branches, but also at those working within the research and innovation system itself.
- Excellent research and collaboration between science and industry require innovative, interconnected and internationally competitive research infrastructures. These act as magnets for collaboration and talent from all over the world. They must be strengthened both structurally and financially and their long-term future ensured, not least with a view to shaping the digital transformation.

4. Improving support for startups and transfer

- Technology-oriented spin-offs must be supported more efficiently. To this end, higher education and research institutions must be provided with substantial and well-planned improvements in their financial and structural operating conditions and be afforded greater freedoms. This also includes the rapid expansion of technology transfer offices in academic institutions.
- In addition, it is necessary to step up long-term support for startups and industrial innovation, among other things with new sources of venture and growth capital provided through Germany's "Zukunftsfonds". Existing programs must be systematically strengthened and the tax framework improved.
- The tax-deductible research allowance should be increased in size and freed of the restrictions regarding affiliated entities.
- To meet the vast economic, environmental and technological challenges, knowledge transfer must be boosted by better linking the innovative forces in basic, applied and industrial research. Available tools include real-world labs, demonstration facilities and experimentation spaces where process and social innovations can also be tried out as well as technologies and products. Exemption from value added tax is crucial for collaborations between higher education and research institutions and their subordinate entities.

5. Driving ahead the digital transformation

- Germany must become a pioneer in digital and data-based research and teaching. Key aspects here include big data applications in science and industry, widespread use of artificial intelligence and machine learning methods, data science and data literacy, and initial and further training for data scientists.
- There is a need for sustained and rapid implementation of initiatives such as the National Research Data Infrastructure, National High Performance Computing Centers, GAIA-X and quantum computing research and development efforts. Fast, stable nationwide telecommunication networks are among the basic requirements here.
- Continuous support must be provided to consolidate and further build upon the recent leap in quality in digital education.

6. Making research and innovation core issues for the EU

- The future of the European model and its values critically depends on our strength in science and innovation. If the EU still wishes to compete with the United States and China in future years, it needs bolder, more ambitious research and innovation policies and a future-oriented budgets.
- Technological and digital sovereignty are key to the EU's future. It is necessary to take stock of where the EU stands in terms of key technologies and strategic value chains. Identified weaknesses must be systematically eliminated.
- European research funding should continue to be guided by the goal of excellence.
- The Important Projects of Common European Interest (IPCEI) funding instrument should be further developed in a transparent manner to fully realize the potential of IPCEIs for technologies at advanced stages of maturity, such as digital technologies or technologies for greenhouse gas-neutral industry. This needs to be coordinated with other European instruments such as the Innovation Fund and the European Innovation Council. Efforts under the European Strategy Forum on Research Infrastructures (ESFRI) must be accelerated.
- Academic mobility and cooperation in Europe are of utmost importance for the strength of the research location. It is imperative that they be promoted - also with Great Britain and Switzerland. Even beyond Europe, international cooperation is fundamental for excellent science and must be consistently promoted. The fundamental values of European science, above all scientific freedom, are non-negotiable.