

## Recommendations for Strengthening the German Quantum Ecosystem

The German government's "Quantum Technology Action Plan" was a crucial step in establishing a national quantum ecosystem. With funding of around three billion euros, it provided important research projects and start-ups with the support they needed. With the funding expiring at the end of 2025, our country needs a renewed commitment to this technology, which will be crucial for its future.

As the Quantum Technology & Application Consortium (QUTAC) and an alliance of fourteen of the largest companies in Germany and Europe, we advocate for a quantum technology strategy tailored to current challenges as an essential element of our countries overarching digital strategy. Strategic coordination across all levels must be established and realised by a coordinating body in Germany that follows an integrated approach and acts in joint European interest. We can no longer afford pursuing separate interests and the unplanned multiplication of R&D activities in the face of strong competition from other economic powers.

Furthermore, we explicitly call for a long-term follow-up funding for quantum technologies. QUTAC conducts application-oriented research and is fully privately funded. Still, we believe that government support for the entire quantum ecosystem, including academic and industrial research as well as start-ups, is essential to ensure long-term competitiveness.

### Towards a sovereign Quantum Ecosystem

Quantum technologies have undergone rapid development in recent years, and the pace of innovation remains unbroken. Important industrial sectors consider them strategic key technologies for the future with significant economic potential. This also explicitly includes security applications with implications for our German and European sovereignty.

Germany's scientific expertise in quantum technologies is high—a local advantage that allows us to further develop them towards profitable applications. At the same time,

technology transfer to the German economy remains a challenge. Considering the current rapid technological and geopolitical changes, Germany and Europe have to speed up the development of their technological sovereignty and secure their economic competitiveness.

Theoretical knowledge must be translated into concrete industrial applications. To achieve this, academic research institutions and industries must cooperate closely within a comprehensive ecosystem. In addition to promoting start-ups, consideration of the value chains of (large) industry and especially the involvement of small and medium-sized enterprises (SMEs) is necessary to achieve widespread technology transfer. The development of quantum software applications and stacks should be equally important as that of quantum hardware.

A strong commitment from politics and society provides the security necessary for industry to take crucial actions in quantum technology. Public-private partnerships at the national as well as on European levels are well suited to achieve this.

## Eight Recommendations for the Development of Quantum Technologies in Germany

To successfully apply quantum technologies economically in and from Germany, we believe the following measures are necessary:

1. **Strengthen the National and European Ecosystem:** Since quantum technologies can be used for dual-use purposes and have security relevance, they are of central importance for German and European sovereignty. Specifically, quantum technologies will enable entirely new applications and markets that Germany and Europe must occupy to secure their economic competitiveness. To take a leadership role in quantum technologies, Germany must invest in the national and European ecosystem. Furthermore, German and European funding should be aligned.
2. **Ensure Nationwide Central Coordination:** The R&D policy for quantum technologies must be coordinated, bundled in a ministry, and managed nationwide with the involvement of the entire ecosystem. Bureaucratic silo thinking and federal competition must be overcome. It is also important to regularly evaluate the effectiveness of

funding methods and make progress more transparent in the future, for example through a KPI system.

3. **Ensure Reliable Funding:** The funding of commercially successful quantum technologies requires a solid foundation. It needs a long-term, reliable horizon free from partisan political interventions and societal hype cycles.
4. **Targeted Implementation of Quantum Computing in Practice:** Quantum hardware, algorithms, software, and applications must be developed within an integrated strategy. QUTAC advocates for the promotion of overarching industrial applications. The transfer from research to practice must be ensured. Cooperation models, real laboratories, and joint projects are suitable for this. Additionally, the state must act as an anchor customer, securing private infrastructure investments through usage guarantees.
5. **Create Unbureaucratic, Low-Threshold Offers:** In the field of entrepreneurial, application-oriented research and application, innovation barriers must be removed. This can be achieved through simplified and digital applications for funding projects, shorter project durations, or new regulations for intellectual property (IP) rights. Uncomplicated access to computational resources of publicly funded quantum computers, both for established companies and for SMEs and start-ups, holds great potential.
6. **Establish Education and Industry Partnerships:** To strengthen technology transfer from research to practice, QUTAC recommends partnerships between universities, technical colleges, vocational schools, and (regional) companies. At the same time, economic partnerships and joint ventures must be established, which contribute to technology transfer and serve as anchor customers for young companies.
7. **Set Suitable Standards and Norms:** Standards and norms play an important role, including by minimizing the risk of dependence on a specific provider. The goal must be to be a “front-runner” through our own technologies in order to set our own standards.

8. **Simplify the Recruitment of Skilled Workers:** Germany needs a central strategy for recruiting skilled workers. Elements of such a strategy should include: (1) recruiting foreign skilled workers, (2) establishing new degree programs and professorships, (3) stronger STEM promotion in early childhood and school education.

Developing commercially relevant quantum technology solutions will play a decisive role in the sovereignty and economic competitiveness of Germany and Europe. To this end, appropriate, targeted government coordination and support are indispensable. As Germany's leading quantum technology consortium, we will continue to accompany and shape this political process.

#### About QUTAC

Since 2021, leading German and European companies have come together in QUTAC to jointly promote the use of quantum technologies in industrial applications and to influence hardware and software development. QUTAC now represents 14 large corporations, which together generate an annual turnover of around 1,050 billion euros and employ more than 2.3 million people worldwide. In QUTAC, the companies are jointly researching the application of second-generation quantum technologies in industrial products and processes in order to prepare for this technology as early as possible and to be able to utilize its economic impact.

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