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THIS ENGLISH VERSION OF THE CALL GUIDELINE OF TOPIC 1 SERVES AS AN ADDITIONAL SERVICE FOR FUNDING RECIPIENTS. THE REGULATIONS IN THE GERMAN VERSION OF THE GUIDELINE ARE LEGALLY BINDING.

SUBMISSION DEADLINE FOR COOPERATIVE R&D PROJECTS AND EXPLORATORY PROJECTS:
5 MARCH 2026
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DIGITAL TECHNOLOGIES 2025

CALL GUIDELINE TOPIC 1 (ENGLISH VERSION)

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Note: The numbering of chapters and tables in the English version corresponds to the numbering in the German version.

2 CALL TOPIC 1 – OVERCOMING THE BOUNDARIES OF DIGITAL TECHNOLOGIES

2.1 Objective

The emergence of newly developed technologies often gives rise to new paradigms that exert influence on other established technological fields[1]. Jointly applying and combining (new) technologies is one way in which existing problems can be solved, and for completely new possibilities and functions to arise. Therefore, the aim of this call topic is the combination of digital technologies.

Funding is available for projects which combine specific pairs of the following four technologies: artificial intelligence (AI), quantum technologies, neuro- and cognitive sciences, and immersive technologies.

The combinations listed in Section 2.3 constitute the minimum requirement for each respective funding.

2.2 Motivation and Background

To date, combinations of different technologies have only been examined sporadically in the research landscape:

- Although AI is already used in other technological fields, it still has considerable and untapped potential to foster and accelerate progress in other technologies.
- Quantum technology research focuses heavily on basic research and hardware, but to date has not systematically considered the possible mutual added value generated in combination with AI.
- Applications of immersive technology mostly focus on education, entertainment and industry; other combinations, such as neuroadaptive dimensions, remain largely unexplored.
- Although neuroscience increasingly benefits from AI, incentives are still lacking for its translation into marketable applications, e.g., for neuroadaptive systems, diagnostic techniques based on quantum sensors, or neuromorphic hardware.

The objective is to stimulate research and development to move toward the respective other technology. The funded research and development projects are intended to enhance the competitiveness of Austrian companies and research institutions.

[1] These paradigms include agentic AI, post-quantum cryptography, heightened sensor & metrological accuracy.

Combination of AI and quantum technology

Both AI and quantum technology have become increasingly relevant in recent years. This trend is expected to continue and to have an impact on other research fields and areas of application. Companies that succeed in harnessing the problem-solving potential of AI and/or quantum technology at an early stage will gain a competitive advantage.

In recent years, AI has developed into one of the most significant technologies of our time and is the subject of intensive discussion due to its potential and impact. Although AI methods have been used for decades, with the emergence and rapid spread of generative models this technology has now entered the mainstream of society.

From the perspective of Europe's quantum industry, the "QuIC Position Paper on the Quantum Europe Strategy" stresses that Europe can secure its global leadership in quantum technology. The white paper cites the transformation of scientific excellence into industrial strength in all quantum technology fields as one of several conditions for achieving this goal. It also requires the development of sovereign capabilities in key areas including quantum chips, hardware and software platforms, and enabling technologies. Quantum technology is seen as an opportunity to benefit society and the economy, to strengthen competitiveness, safeguard security, and increase technological sovereignty. Although this report addresses the European perspective, it applies in part to Austria.

Both AI and quantum technology have a transformative character, so that combining the two is of particular interest. The following publications illustrate various aspects of this combination:

- M. Klusch et al. (2024), in their article "Quantum Artificial Intelligence: A Brief Survey", describe the state of research and the potential offered by quantum computing and AI. It places a particular focus on the feasibility and potential offered by the joint use of these technologies. The authors suggest that attention be paid to specific fields of application and the limitations of combining quantum technology and AI.
- The Quantum Community Network, in its Artificial Intelligence and Quantum Computing White Paper, notes that Europe possesses strong scientific expertise in both technologies. The white paper sets out the breadth of possibilities and the respective challenges. Close cooperation between academic and industrial R&D is cited as the prerequisite for market success.
- In early October 2025, in its article "Quantum and AI: A powerful partnership for the next digital revolution", the OECD examined the combination of AI and quantum technology. The article presents the strengths and weaknesses of both technologies and lists possible combinations. Using the example of quantum machine learning, the article also describes obstacles that still need to be overcome.

Specific examples of possible areas of research which combine these two technologies are set out in Section 2.3.1.

2.3 Prescribed Technology Combinations

This call topic requires projects to address one of the prescribed technology combinations. Depending on the technology combination, funding is available for either cooperative R&D projects or exploratory projects, as well as qualification networks.

The project's commercial field of application can be freely selected.

The combinations eligible for funding are set out in sections 2.3.1, and 2.3.2.

Table 1: Funding instruments and funding amounts for combinations of digital technologies

Funding instrument	Combination of artificial intelligence and quantum technologies (see Section 2.3.1)	Other combinations (see Section 2.3.2)	Max. funding (EUR)
Cooperative R&D Project	applicable	not applicable	4.72 million
Exploratory Project	not applicable	applicable	2 million (500,000 per combination)
Qualification Networks	applicable	applicable	200.000

2.3.1 Combination of artificial intelligence and quantum technologies

Both artificial intelligence and quantum technologies offer great potential for application. Both are subjects of research and, in part, already at an early application stage. Funding is available for projects combining the two technologies.

Funding instruments (cf. Table 1):

- Cooperative Projects (industrial research or experimental development) with a maximum funding of EUR 1 million per project, applications must be submitted in English.
- Qualification Networks, applications must be submitted in German.

Projects may contribute to the following areas of research (not exhaustive)[2]:

Since the training and inference of AI models depends heavily on the quality of the underlying data, various quantum technologies can be used to improve these processes. The technologies used may include quantum sensing and metrology and, especially over the long term, quantum algorithms. This allows typical use cases to be addressed. In the field of IT security, for example, combining AI with blind quantum computing may open up new possibilities. Conversely, AI methods can be used in the development, optimisation, and operation of quantum hardware, especially for quantum error correction and avoidance. The individual aspects are elaborated below:

Quantum technologies can be used to improve the training and inference of AI models. A goal of current research is to identify AI methods, supported by quantum technologies, that can outperform typical approaches. Ideally, this also includes mathematical proof and thus traceability. Promising areas of application include materials research, medicine & health, remote sensing, finance and process improvements. For example, quantum-supported AI methods can directly parallelise the exploration of logic trees in symbolic AI, optimise coordination in multi-agent systems, and drive forward the development of new or improved (e.g. noise-reduced) quantum algorithms. (Hybrid) quantum machine learning approaches exploit the fact that, under suitable conditions, quantum algorithms can process information more efficiently than traditional algorithms. Successful implementation leads to better performance and lower energy consumption. However, there are currently still (substantial) challenges in hardware development, data processing, and HW/SW co-design.

AI methods, in turn, can be used to support and enable quantum technologies. This type of hybrid approach allows the evaluation of quantum data (e.g. from quantum sensors or quantum computers) to be improved. At the same time, AI-driven simulations can optimise research and development as well as the control of quantum technologies. Approaches to error correction as well as error avoidance in quantum computing are particularly important. Such methods can significantly optimise the performance and reliability of the quantum technologies in question. Developments of this kind include hybrid quantum-classical devices, control protocols, and calibration methods.

Finally, ***developing quantum technologies with AI-coordinated quantum feedback***: Quantum-based optimisation of AI methods improves the operation of more complex quantum technologies (quantum computers, quantum networks, etc.).

[2] This summary is based on the Quantum Flagship's white paper and the OECD article "Quantum and AI: A powerful partnership for the next digital revolution".

2.3.2 Further combinations of digital technologies

Funding will be provided for projects addressing one of the following four technology combinations:

- Artificial intelligence and neuroscience
- Immersive technologies and neuroscience
- Artificial intelligence and immersive technologies
- Neuroscience and quantum technologies

Funding instruments (cf. Table 1):

- Exploratory Projects, preliminary study for an R&D project with a maximum funding of EUR 500,000 per combination, applications must be submitted in English.
- Qualification Networks, applications must be submitted in German.

The research questions outlined in Sections Fehler! Verweisquelle konnte nicht gefunden werden. **to** Fehler! Verweisquelle konnte nicht gefunden werden. **below are provided as examples.**

2.3.2.1 Artificial intelligence and neuroscience

Combining AI and neuroscience could help in deciphering neuronal activity patterns more precisely using machine learning methods. These patterns may include speech, attention or emotions. It would also be possible to investigate how neuroscientific principles such as plasticity, memory or attention can be incorporated into AI models. This would allow the creation of more robust and energy-efficient systems. Another example is neuromorphic computing, where the architectural and algorithmic principles of the brain are used to develop hardware and software. This would support the development of computationally and energy-efficient AI systems. AI could also be used to improve the diagnosis and therapy of neurological diseases. This requires ethical issues surrounding the processing of sensitive brain data to be resolved.

2.3.2.2 Immersive technologies and neuroscience

By combining immersive technologies with neuroscience, virtual and augmented environments (VR and AR) can be developed that can capture and train cognitive processes in realistic yet controllable scenarios. Neuroadaptive extended reality (XR) systems open new horizons in personalised learning and therapy settings. Use cases include rehabilitation after strokes or therapies for anxiety disorders.

2.3.2.3 Artificial intelligence and immersive technologies

Combining AI with immersive technologies allows XR environments to be made more dynamic, realistic, and adaptable. This, in turn, could enable more efficient data processing in immersive applications, reducing the energy consumption and computing power needed on end devices.

One challenge that could be addressed by this technology combination is reality capture – the creation of a detailed digital copy of the real world. Reality capture

can be improved through integration with AI and machine learning. The aim here is to provide automated data collection, improved accuracy, and advanced analyses. These technologies can help to identify patterns, anomalies, and trends in the captured data. As a result, virtual spaces can be continuously adapted to changes in the real environment.

Conventional AI models process data in isolation from context. In contrast, so-called embodied AI agents have a physical or virtual presence allowing them to interact with their environment and users in meaningful ways. This interaction can take place via sensors, actuators or loudspeakers, for example. In virtual environments, embodied AI agents can take the form of avatars that respond to users' gestures or voice commands. Promising avenues include the automated creation of virtual environments from video data and other large datasets, for subsequent use in training embodied AI agents.

2.3.2.4 Neuroscience and quantum technologies

Combining neuroscience with quantum technologies can improve diagnostic accuracy. Quantum sensors can capture neuronal activity with high resolution and in a non-invasive manner. Quantum technologies can also provide new insights into neurological processes.

2.4 Requirements for Cooperative R&D Projects and Exploratory Projects

Consideration of technological sovereignty

The research and development of digital technologies must be seen in the context of European technological sovereignty. European developments must therefore be considered. If these are required for the exploratory project or cooperative R&D project, they should be addressed in the project's description.

Projects can also contribute to European technological sovereignty by enabling new applications or new fields of application.

External project dependencies must be specified in the risk analysis or in the description of commercial exploitation, depending on the type of dependency. These may include dependencies related to the available data, hardware and/or software.

Cost requirements

In the cost plan, two working days must be allocated for networking with other funded projects. This is part of the supporting initiatives provided by the Federal Ministry of Innovation, Mobility and Infrastructure (BMIMI) for funded cooperative R&D projects.