JOINT CALL DATA - AI – QUANTUM

CALL DESCRIPTION

The Ministry of the Economy, the National Research Fund ("granting authorities"), and Luxinnovation have joined forces to launch a funding opportunity that supports consortia of private companies and public research institutions in conducting R&D projects in the fields of Data, Artificial Intelligence (AI) and/or Quantum. This initiative aims to stimulate the development of new applications, services, and technological capabilities that leverage data analytics, AI-based innovation, and/or emerging quantum technologies, thereby strengthening companies' innovation capacity and overall competitiveness, while also contributing to the creation of new scientific knowledge and advancing the state of the art in these fields.

Context of the call

The development of disruptive innovations along with the broader adoption of digital technologies and the fostering of a collaborative ecosystem, supporting technology and knowledge transfer among private and public actors are key priorities of the government's strategy to accelerate digital sovereignty. Data, AI and quantum technologies are the technological backbone of the national ambitions.

The collection, curation and processing of large data sets offer tremendous opportunities to simulate, analyze, and interpret complex systems across domains. The computation power of HPC offers great value in big data analytics. These types of endeavours would take a very long time or would not even be possible on traditional laptops or workstations, whereas HPC is able to analyse data with unparalleled speed and impressive accuracy. HPC can also reduce the cost of an organization's R&D process through simulation and virtual prototyping, enabling them to stay ahead of the competition and significantly reduce time to market. HPC is thereby particularly useful for performing simulations that require high-resolution and high-accuracy results to explore the granularity of large and complex problems with many parameters that need to be tuned simultaneously.

AI has become popular partly due to media coverage of recent developments in general purpose AI models, generative AI, or large language models (LLM), and partly due to the EU AI Act, which establishes a common framework for the development and deployment of AI-based systems in the European Union. AI encompasses a wide range of technologies, from machine learning and computer vision to natural language processing. Thanks to AI, machine-based systems are able to act intelligently, i.e. their actions are aligned with a priori defined goals, they adapt their behavior based on past experience or changes in the environment. Based on input, AI systems generate predictions or recommendations with a degree of autonomy. Companies in a wide range of industries can use AI to optimize their efficiency, improve the way they work, and innovate. AI models can be used to automate repetitive tasks, improve the accuracy of predictions, or provide in-depth analysis for informed decision making. In addition, access to powerful computing infrastructures has made it possible to process massive amounts of data and train more advanced and complex models.

Quantum technologies are expected to benefit a wide range of sectors for solving high-complexity problems as well as for secure data transmission. The development of quantum and hybrid algorithms offers novel opportunities in areas such as optimization, materials discovery, or machine learning. While these can be run on quantum computing infrastructures, HPC also plays an increasingly important role in

quantum research. It can be used to run quantum simulations via dedicated emulators, enabling researchers to model quantum algorithms and systems even in the absence of reliable physical quantum hardware. This integration is particularly valuable for exploring use cases, benchmarking performance, and advancing algorithm development. Research on quantum communication networks and quantum cryptography improves the security of data transmission which is especially relevant for mission-critical applications. Although the broader adoption of quantum-based innovations in industrial settings is expected to take several years, see decades, companies can take advantage of striving already at this stage for an improved understanding of potential use cases and the underlying technologies.

The adoption and development of solutions based on these emerging digital technologies are crucial to remaining at the forefront of technological progress and to enhancing companies' competitiveness. In the AI and data domain, the recently launched national AI Factory is one of the key initiatives supporting this objective. It acts as a one-stop shop that increases the visibility of available initiatives and services, while providing access to essential resources to accelerate AI development in Luxembourg. It also aims to promote collaboration, knowledge exchange, and inter- and intra-sectoral synergies.

To further incentivize the uptake of these digital technologies, the Ministry of Economy, the National Research Fund (FNR) and Luxinnovation are launching a joint call for proposals to encourage close and interactive collaboration between private companies and public research institutes to carry out innovative research projects. It is a strategic priority of the government and the FNR to turn public research into a competitive advantage for Luxembourg and to give researchers the opportunity to pursue a high-impact research strategy while working with the most innovative private actors. To this end, the development of Luxembourg's knowledge-based economy is supported by promoting applied research, strengthening the collaboration between public research and the innovative economy, and facilitating the potential commercial exploitation of research results.

Purpose of the call:

The purpose of this joint funding call for projects is to accelerate the development and integration of data-driven innovation, artificial intelligence-based solutions, and emerging quantum technologies within companies' internal R&D and innovation processes. In addition, it aims to stimulate the creation of new applications, services, and technological capabilities that leverage these advanced digital technologies. The joint funding call therefore supports the implementation of high-quality, high-impact, and innovative applied research and development projects with a focus on data, AI, and/or quantum technologies.

Objectives:

As a cornerstone of a company's long-term performance and competitiveness, continuous engagement in innovation and R&D is key. An effective R&D strategy relies on cutting-edge technologies that incorporate the latest scientific and technical advances. Leveraging emerging capabilities in data analytics, artificial intelligence, and quantum technologies is essential in this context and represents a key driver for building a sustainable, competitive, and digitally resilient economy in Luxembourg, as also emphasized in the recently published strategic initiative *« Accelerating Digital Sovereignty 2030 »*.

In this spirit, the present call for projects aims to facilitate collaborative initiatives between public research institutions and companies in order to jointly achieve applied research and development outcomes that are mutually beneficial. Public research institutions will have the opportunity to explore new research

challenges and advance their scientific expertise, while companies can strengthen their innovation capacity and gain access to world-class public research competencies in data, AI, and quantum technologies. Projects are expected to generate tangible added value for Luxembourg's industrial and economic landscape and to align with national strategic priorities.

The specific objectives of the Data–AI–Quantum Joint Call are:

- **To foster innovation and sustainable value creation** by stimulating strong partnerships between public research institutions and industry in the fields of data analytics, artificial intelligence, and quantum technologies.

- **To strengthen companies' expertise in:**

    o Advanced data processing, analytics, and data-driven decision-support systems.

    o AI models and methods, enabling their development, fine-tuning, and deployment for relevant industrial and societal use cases.

    o Quantum technologies, including quantum algorithms, simulation and communication approaches, thereby preparing companies for future capabilities in quantum-enabled computation and communication.

- **To encourage the implementation of innovative projects** that contribute to the development of Luxembourg's economic landscape and are consistent with national strategic and digital-sovereignty priorities.

- **To enhance Luxembourg's attractiveness as an innovation hub** by promoting advanced technological research and high-impact applications in data, AI, and quantum technologies.

Call topic:

Projects submitted under this call must be innovative, of the highest quality, and contribute meaningfully to the development of Luxembourg's economic landscape. They should demonstrate a positive and sustainable impact by diversifying or strengthening the future business activities of companies, while simultaneously enhancing their R&D capabilities, knowledge base, and technical expertise. Moreover, the projects should clearly build upon the state of the art, demonstrate scientific excellence, and contribute to the creation of new scientific knowledge. Eligible projects may fall within the categories of *industrial research* and/or *experimental development* as set out in the RDI law [1].

The R&D projects should address complex and forward-looking challenges, resulting in new solutions or services that either outperform existing technologies or significantly accelerate their development. Projects must also tackle key issues relevant to industry, science, or society at large. Applicants are required to clearly justify the integration of data analytics, AI and/or quantum technologies, and demonstrate how their proposed products, processes, or services will benefit from these innovations.

This joint call focuses on R&D initiatives in **Data, Artificial Intelligence (AI)** and **Quantum Technologies**, that are aligned with national strategic priorities in research and industry, as well as with the recently

published strategic initiative *« Accelerating Digital Sovereignty 2030 »*. The following thematic application areas are defined:

1) Data-based solutions for advanced simulations and analytics

This area targets projects leveraging the opportunities of big data and potentially the computing power of HPC to simulate, analyze, and interpret complex systems across domains, accelerating innovation in science and industry.

- Large-scale simulations (e.g. Computational Fluid Dynamics (CFD), Finite Element (FE) analysis) for engineering design, materials science, and environmental applications
- Big data analytics and visualization techniques applied to vast datasets for industrial or scientific insights
- Advanced predictive modeling and forecasting of complex systems
- Curation and preparation of relevant datasets, including the generation of synthetic data
- Innovation in data management among others related to infrastructure, privacy preservation for sensitive data and sharing

2) Artificial Intelligence (AI) for industry and scientific innovation

This topic area supports the development and application of AI technologies to improve industrial processes, enable scientific breakthroughs, and create intelligent systems that drive innovation.

- Machine learning-driven as well as multimodal AI-based solutions to optimize industrial processes
- AI-based automation, including pattern recognition, predictive maintenance, and computer vision
- AI-powered decision-support to address complex industrial and scientific problems including the development of domain-specific foundation models, physics-informed AI and AI agents
- AI-enhanced control engineering for autonomous systems including the development of real-time and edge AI-based solutions
- Innovation in trustworthy and sustainable AI including developments in frugal AI

3) Quantum technologies for advanced computing and secure communication

This topic area supports research and innovation activities that leverage the potential of quantum technologies in the following domains:

- **Quantum computing software and algorithms, quantum simulation** for solving high-complexity industrial and scientific problems

  - Development of quantum and hybrid algorithms for industrial applications in areas such as optimization, materials discovery, or machine learning, running on quantum computing infrastructures or on quantum simulators executed on classical HPC systems.
  - Research in control, error mitigation/correction, compilation, and hybrid workflows aimed at increasing software maturity.

- **Quantum communication networks and quantum cryptography** for secure data transmission in mission-critical applications. This includes, for example, research and innovation activities in:

  - network components and protocols, integration with classical telecommunication infrastructures, security aspects and interoperability, quantum key distribution, multi-user networks, quantum repeater, entanglement-based quantum networks.

This call for projects is aimed at private-sector stakeholders with strong R&D capabilities who see significant potential in developing applications based on, or making use of, data, AI, and quantum technologies. Its objective is to support these companies in exploring, adopting, and integrating cutting-edge AI and quantum technologies into their R&D workflows or operational processes, thereby accelerating innovation and strengthening long-term competitiveness.

To ensure the successful implementation of these complex technologies, each project must be carried out through close collaboration between a public research institution and an industry partner. These partnerships are crucial for providing the scientific expertise, access to specialized infrastructure, and guidance on best practices required for effective execution. By fostering strong public-private cooperation, the initiative aims to facilitate knowledge transfer, lower technological barriers, and maximize the return on R&D investments.

General eligibility criteria and instruments of the joint call:

1) Consortia are expected to include at least one eligible participating company and one FNR-eligible participating research organization. In the consortium, the contribution of the private and public parties should be as close to equal as possible, whereas no party shall bear more than 70% of the total project cost. Companies must fulfil the general eligibility criteria as set out in the RDI law [1] and the respective criteria of the specific state aid scheme they apply for as set out in the R&D schemes [2]. Research organizations must be eligible under article 3-(2) of the FNR statute (*Loi modifiée du 31 mai 1999 portant création d'un fonds national de la recherche dans le secteur public*) and be registered at the FNR.
2) The project must be in the field of industrial research and/or experimental development as defined in the RDI law [1], and in line with the call topic.
3) For research and development activities under the joint call for projects, public institutions should comply with the general principles set forth in the FNR Guidelines, such as the formal requirements to qualify as PI (Principal Investigator) of an FNR-funded project, the FNR Research Integrity Guidelines, and the FNR data management plan, as well as those included in the FNR BRIDGES Programme description.
4) The cost to cover the PhD student and their research is not permissible for projects in this joint call.
5) A PI may submit a maximum of two proposals per call.
6) One resubmission is allowed.
7) For classical or narrative CVs, a maximum of three pages is allowed.
8) The consortium must have the necessary expertise in the relevant fields to carry out the specific research tasks. The FNR will fund the costs of the eligible research organizations in Luxembourg,

up to 500.000 € per project covering all project specific costs. The Ministry of the Economy will co-finance costs borne by Luxembourg eligible companies up to 700.000 € per project, using the R&D aid scheme [1].

It is expected that the projects will be considered as industrial research and/or experimental development projects. In this case, the maximum co-financing rates for companies through collaboration are as follows:

Maximum aid intensities	Large company	Medium company	Small company
Experimental development	40%	50%	60%
Industrial research	65%	75%	80%

Project durations are targeted for a 24 to 36 months period.

Upon justification regarding their liquidity needs, the Ministry of the Economy may give a 30% upfront payment to SMEs leading a project selected in this Joint Call. For public research organisations FNR financial regulations apply.

Self-funded international or national partners are permitted to participate in the consortium.

Evaluation criteria and scoring system of the joint call:

The project proposals will be evaluated in a balanced manner based on the following criteria and taking into account the general considerations formulated under the call topic and objectives:

1. Relevance (33.3%)

This criterion aims to evaluate the quality and the innovative character of the project through the following aspects:

- project idea; clarity and pertinence of the objectives;
- level of innovation, including advance on state of the art;
- soundness of the research approach and methodology;
- scientific and technical maturity of the project;
- clarity, coherence and adequacy of the application regarding the theoretical framework, objectives, methodology, work plan and expected results and impacts;
- national societal and economic relevance of the expected project results.

2. Implementation: quality and efficiency of the project plan (33.3%)

This criterion is intended to assess the quality and feasibility of the project work plan to ensure its success. The following aspects are considered:

- coherence and effectiveness of the work plan, including appropriateness of the allocation of tasks and resources;
- realistic timing taking into account where applicable time allocations within computing infrastructures;
- competences, experience and complementarity of the individual participants, as well as of the consortium and collaboration as a whole;

- appropriate co- and pre-financing capacity of the participants;
- level of ambition of the collaboration and commitment of the participants in the proposed program;
- appropriateness of the measures to comply with applicable legislations and regulations;
- credibility of the management structures and procedures, quality of the risk management plan and soundness of the risk mitigation plan.

3. Impact (33.3%)

This criterion is intended to assess the potential impacts and contributions of the project. The following aspects are considered:

- broader impact with economic, environmental and societal added value of the proposed research and development project in line with national priorities;
- strengthening of the competitiveness and growth of the companies involved by developing innovations;
- effectiveness of the proposed measures to exploit and disseminate the results of the project;
- contribution of the project to the advancement of knowledge and expertise of companies in the fields of data, AI and quantum technologies;
- particular focus on R&D projects involving new innovations and processes rather than improvements to existing technologies and core business activities.

Call process:

The submission and evaluation process will be composed of 2 phases.

- **Submission process:**

Phase-1: (1st of March 2026 – 1st of April 2026 2pm)
Project outline (PO) to be submitted on the research-industry-collaboration platform of Luxinnovation.

The PO shall provide information on:

- Project description;
- Project outcomes;
- Expected technical contributions of the different partners;
- Statement explaining the benefits of using data, AI and/or quantum technologies;
- Intellectual Property Rights for collaborative project proposals (in view of a draft collaboration agreement in phase 2);
- Preliminary project costs;
- CV of the main investigators;
- For companies: Organizational chart of the group, 2023 and 2024 (or 2025 if available) balance sheets and P&L accounts of the applicant and the group, cash-flow forecast.

Phase-2: (30th of April 2026 – 1st of July 2026 2pm)
Full project proposal (FPP) to be submitted by each project participant either to the Ministry of the Economy (Myguichet platform) for companies and to FNR (FNR Grant system) for accredited research

organizations. The FPP as well as the financial annexes to be appended by each partner to the aid application can be downloaded from the platform *www.research-industry-collaboration.lu.*

The FPP shall provide information on:

- Detailed description of the research project;
- Different activities of the project (Work packages);
- Description of the technical challenges and implementation of the project;
- Description of the expected outcome and the economic impact;
- Milestones;
- Timeline;
- Resources;
- Description of costs;
- Collaboration agreement (draft ready for signature) including agreement on intellectual property[1];
- GDPR aspects: data flow and ownership, delegations to data processors.

- **Evaluation process:**

Phase-1:
Based on the Project Outlines (PO) and the annexes submitted via the research-industry-collaboration platform, the granting authorities in collaboration with Luxinnovation will check:

- Eligibility of all parties and co-funding capacity of the company;
- If the project description is in line with the call topic;
- If the technical capabilities and benefits of using data, AI and/or quantum technologies are consistent with the topic and the objectives of the call.

Participants will obtain written feedback from the granting authorities on Luxinnovation's research-industry-collaboration platform. Based on the analysis of the eligibility, the level of innovation and quality of the application, as well as the economic and societal impact in line with national strategic priorities, a recommendation for a submission to Phase-2 will be offered.

Phase-2:
Full project proposals (FPP) prepared in Phase-2 will be reviewed by an independent expert panel ("panel") that will assess FPPs from a scientific/technical and economic point of view. The panel will establish a ranking list based on the criteria set in the "Evaluation criteria and scoring system" section above. The highest ranked projects will be recommended for funding to FNR and Ministry of the Economy.
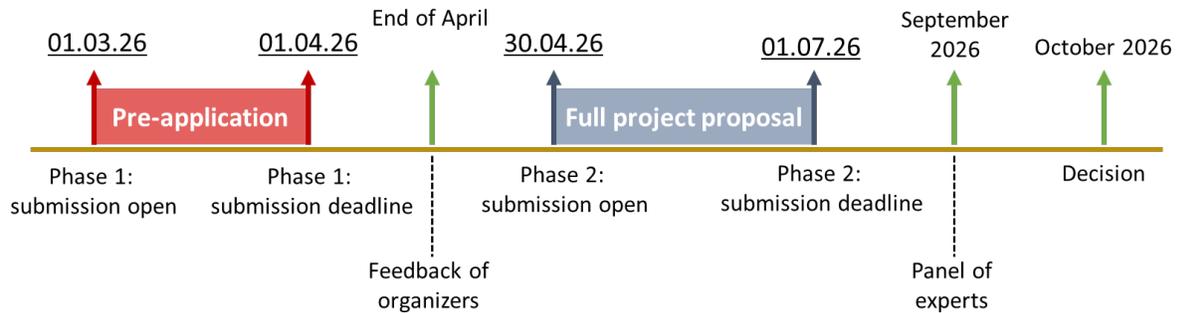
A project can only be funded by a concurring decision of FNR and the Ministry of the Economy.

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[1] Any intellectual property (IP) rights that result from the collaboration should be allocated to the different collaboration partners in a manner which adequately reflects their contributions and respective interests in the project. The main IP terms of the collaboration agreement between the company and the public research institute should thereby comply with the "Framework for State aid for research and development and innovation (2014/C 198/01)", paragraph 2.2.2. "Collaborations with undertakings" [3].

The results of the evaluation will be communicated in October 2026, at the latest. Projects are expected to start in late 2026/early 2027.

Joint Call Data-AI-Quantum Timeline:

References:

[1] Law of 6 June 2025 on the promotion of research, development and innovation

[2] *https://guichet.public.lu/en/entreprises/financement-aides/aides-recherche-developpement/rdi/aides-rdi.html*

[3] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0651 ; https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023R1315