# QUANTUM ACCELERATION PROGRAM

The corporate solution for your organisation to become quantum ready

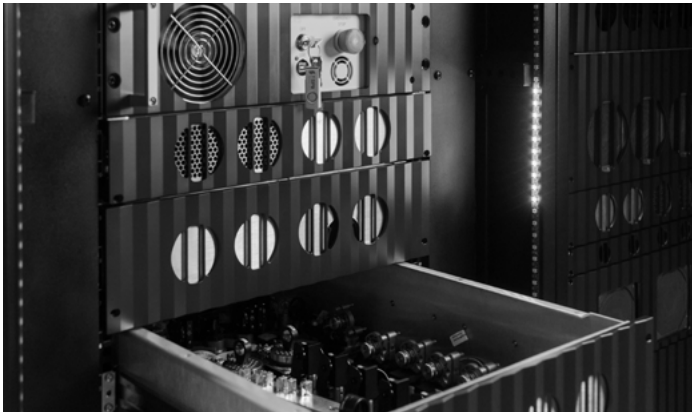
QUANDELA

## Adopting quantum computing, the right strategy

During the last decades, organizations have faced disruptive technology challenges. We went through the digital and cloud transformations; now, we are experiencing the AI transformation. Quantum computing is next in line. This rapidly emerging technology holds the potential to address the most pressing scientific and industrial computational applications for simulations, optimization, and quantum AI. It will certainly change the world in ways escaping our imagination. For these reasons, many industries are already adopting quantum computing. However, embracing emerging technologies goes beyond a technical problem; it is a people's challenge. Quandela's Quantum Acceleration Program will effectively guide your organization's journey to your quantum transformation.

## Photonics, the clear option for quantum transformation

Photonics is a clear option for building a truly large-scale quantum computer for quantum utility. Photons are natural information carriers, making photon-based technology ideal for computations, communications, and cybersecurity applications. Quandela's unique technology is modular, interconnected, and compatible with state-of-the-art error-correcting codes and is on the fast track to quantum advantage. Our algorithms are designed to tackle a variety of industrial applications, including energy, healthcare, chemistry, and finance.



## Quandela's Quantum Acceleration Program consolidates your quantum adoption

The Quandela Quantum Acceleration Program (QAP) is your pathway to achieving quantum transformation. This program is designed to support your organization from the initial exploration and comprehension of quantum technologies to advanced quantum advantage analysis and on-premises delivery of Quandela hardware. The program comes in three types: Quantum Exploration, Quantum Value, and Quantum Fabric. Your organization's needs will determine which of these you choose. The program then runs through four key phases: Discover, Design, Develop, and Deliver, known as the 4 Ds of the Quantum Acceleration Program. The table below provides a detailed overview of the activities available within each phase.

Photons are natural information carriers, making photon-based technology ideal to reach quantum advantage for simulations, optimization, and quantum AI.

# The Quantum Acceleration Program Options' Activities

| | Quantum Exploration | Quantum Value | Quantum Fabric |
|---|---|---|---|
| Discover  | Extensive training program on quantum programming using Quandela's Training Center and Software Development Kit. | In-depth training on Quandela algorithms and use cases offered in our Quantum Toolbox. | Exclusive guided tour to our industry-grade quantum computer factory, where you will get familiar with our innovations. |
| Design  | Workshop sessions to assess what area of your business is being disrupted by quantum computing and which use cases are relevant for your organization.<br>Create a simplified model tailored to one use case. | End-to-end algorithm analysis for use cases to select the most promising one. Create a complex model tailored to the chosen use case. | Workshop session to assess your hardware and software needs. |
| Develop  | Create a Perceval implementation of the simplified model created in the Design phase. | Develop a Perceval implementation of the complex model from the Design phase and scale it to the limits of classical simulability. | Co-develop the hardware and software components tailored to your needs. |
| Deliver  | Get hands-on experience by running your algorithm on a QPU with the Enterprise Cloud Plan. | Conduct simulations on our GPU-based HPC facility. Analyze the results in alignment with Quandela's roadmap and assess the quantum scaling process to the point where your business achieves quantum advantage. | Receive and integrate the co-developed quantum computer and get trained in using it. |

## Quandela Center of Excellence

Quandela Quantum Acceleration Program lays the groundwork for your quantum transformation by fostering transparency in program operations and uniting teams with a shared understanding of implementing quantum algorithms and addressing complex business challenges.

This approach provides a proven framework for efficiently designing and establishing a Center of Excellence for Quantum Transformation (CEQT).

« Quandela has proactively addressed the issue of MAPF (Multi Agent Path Finding).

Their open and honest exchanges reflect a constant commitment to finding solutions, despite the current global quantum hardware limitations, and the need to further challenge quantum-based software solutions. Both our companies have learned a great deal from this study. »

**Laurent MIRALLES,**
Head of Massy Prototyping Engineering Unit
at Safran Electronics & Defense

# Examples of solutions to use cases found during the program

## Automotive and aerospace: Image Generation from Day to Night

Quantum Machine Learning

The Challenge:
AI models require large training data, especially for specialized scenarios like night images. Acquiring night-time images of streets and runways is expensive and time-consuming. Complex lighting changes between day and night scenes require more than simple image darkening.

Our Solution:
Our Quantum Generative Adversarial Network (QGAN) algorithm generates artificial night images from existing daytime images. This method holds the potential to reduce the cost and time for acquiring night-time image data and increases diversity in training datasets for AI models, bringing the industry closer to more robust and accurate AI systems for night-time operations.

## Drone traffic management

Optimization

The Challenge:
Managing and optimizing drone traffic is complex due to numerous constraints (no-fly zones, positioning, accuracy, or energy limitations). Collision avoidance in fleet or swarm drone missions is critical and computationally challenging. Classical algorithms struggle with the scale and complexity of multi-drone coordination.

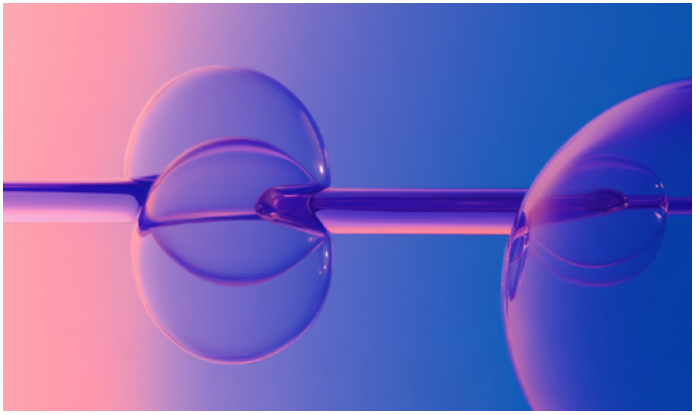
Our Solution:
Quandela has developed a Quantum Reinforcement Learning (QRL) algorithm, a solution that holds the potential to create more efficient and safer drone operations in complex environments, as well as improved collision avoidance systems for autonomous drone fleets.

## Chemistry: Molecular simulation for drug discovery

Simulations

The Challenge:
Simulating how complex molecules interact with each other, such as the components of new drugs with proteins, requires doing computationally intensive calculations. Enhancing drug discovery unlocks the potential for breakthrough therapies and disease cures.

Our Solution:
Quandela's Variational Quantum Eigensolver (VQE) calculates the ground state energy of molecules. Our solution offers potential speed-ups in the energy calculation of large molecules and describes the chemical behavior of the molecules more accurately. In addition, it enhances the ability to discover new drugs.



Our algorithms are designed to tackle a variety of industrial applications including energy, healthcare, chemistry, and finance.

Take the first steps:

Register now for your free orientation session

www.quandela.com

## Do you have any questions?

Reach out to us.

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