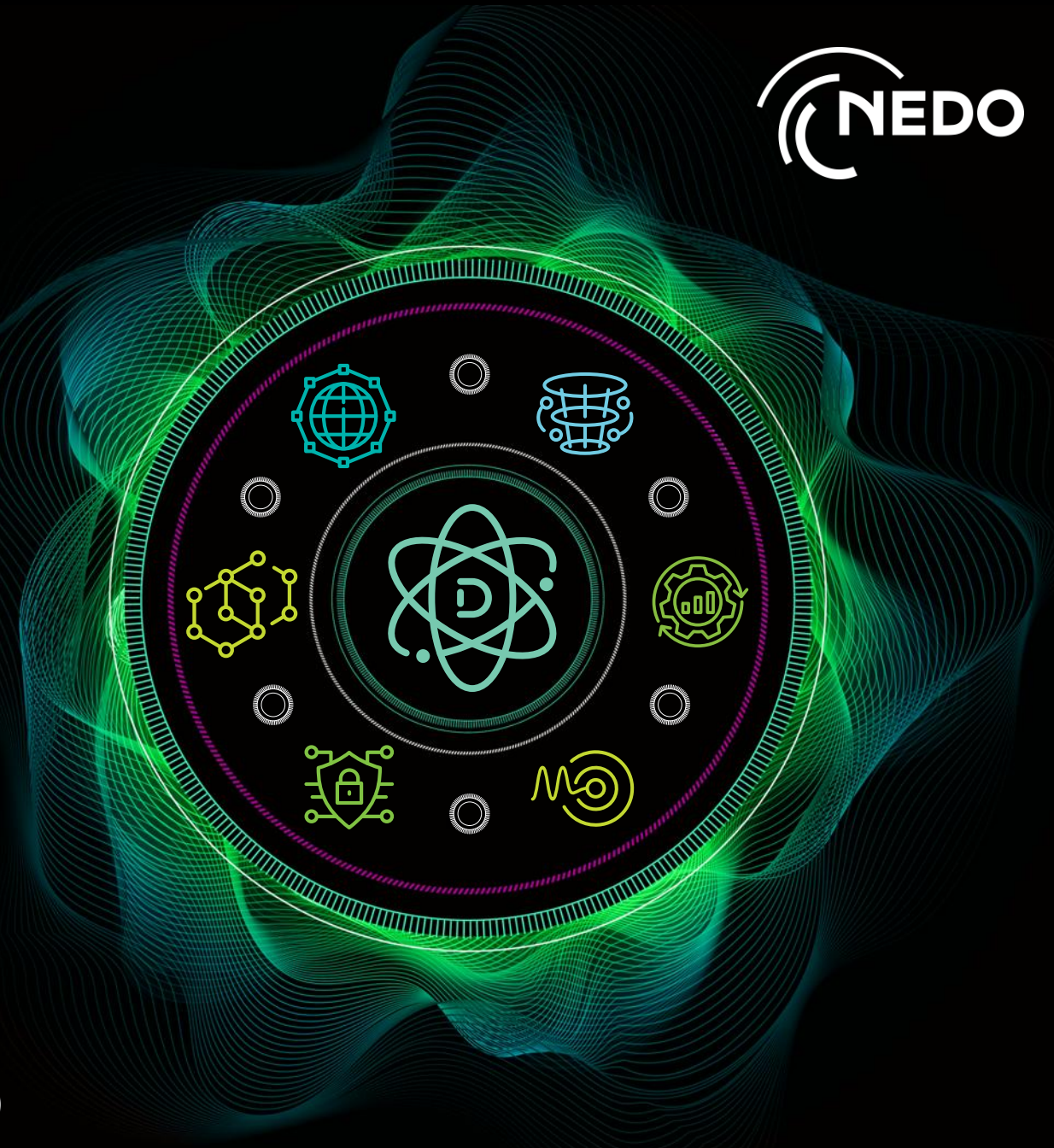
Quantum Computing Use Cases

Optimizing stock investment portfolio

MELCO INVESTMENTS



New Energy and Industrial Technology Development Organization (NEDO)

MELCO INVESTMENTS: Optimizing stock investment portfolio [2020/02]

Operational Use

Industry	Finance
Process	securities
Method	combinatorial optimization
Category	Ising*

Background

- What is important in investment and asset management is the balance between return and risk. When choosing an investment destination, it is important to seek a large return while preparing for possible sudden price fluctuations. One of the measures is **diversification through a financial asset portfolio.**
- In order to select a portfolio by combining the most appropriate financial products, **it is necessary to examine the composition ratio of financial products by quickly analyzing and judging the ever-changing financial conditions of companies and market trends.**
- The financial asset portfolio **has a large number of combinations** depending on the number of issues handled

Issues and motivation to be solved

- In order to optimize the portfolio of financial assets, **For example, to select 50 stocks from 100 stocks, 10^29 combinations are required, which is difficult to calculate with conventional classical computers.**
- MELCO INVESTMENTS **attempted to reduce computation time by solving the portfolio optimization problem of financial assets using quantum technology**

Problem setting as a quantum computer

- **Evaluate the calculation time for the portfolio optimization problem of financial assets** based on stock data (several hundred stocks) and constraints
- Machine utilizes **Fujitsu digital annealer**

Expected business benefits

- Ability to **calculate an optimal portfolio of financial assets in about 10 minutes** for hundreds of stocks
  - ✓ This is the first practical application of digital annealer in the financial sector.



Reference: Fujitsu Limited "In an Age of Uncertainty, Challenges Faced by Enterprises Are Solved by Digital Annealer" (https://www.fujitsu.com/jp/digitalannealer/news/202103-article/)
*Ising: A computing approach, mainly associated with quantum annealers and simulators specialized for the Ising model, in which a problem is first formulated as an Ising model and then solved computationally. It is particularly well suited to problems that involve finding the optimal combination from a vast number of possibilities.

More use cases are available on our website. We invite you to explore them.
https://www.quantum-computing-use-cases.nedo.go.jp/english/

More Use Cases

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