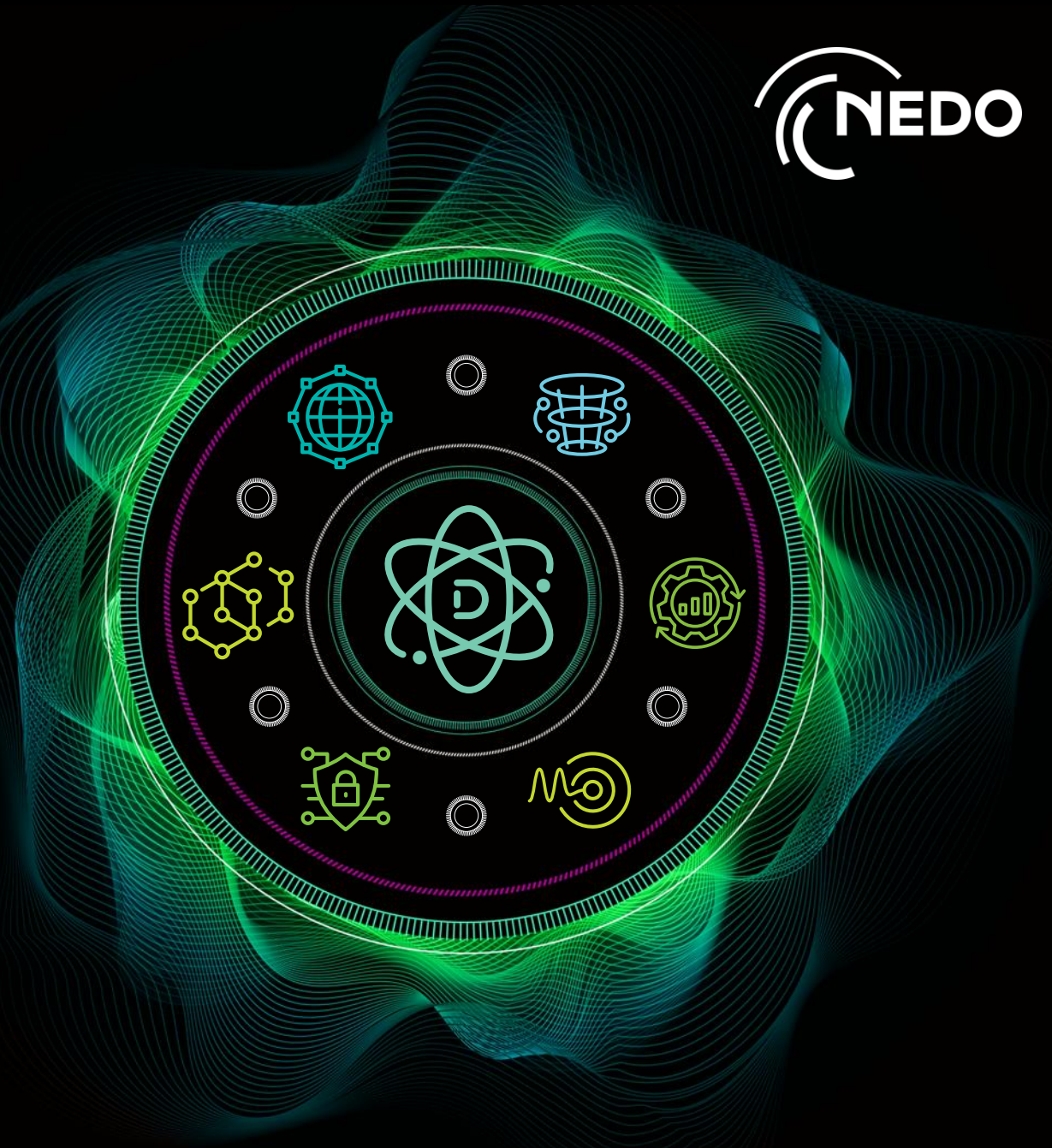
Quantum Computing Use Cases

Portfolio optimization of liquid assets

NatWest



New Energy and Industrial Technology Development Organization (NEDO)

NatWest: Portfolio optimization of liquid assets [2018/10]

Validation

Industry	Finance
Process	bank
Method	combinatorial optimization
Category	Ising*

Background

- Financial institutions should ideally incorporate liquid and creditworthy assets, including cash, bonds and government bonds, to provide the greatest possible return while maintaining an acceptable level of risk
- However, they are **constantly faced with the challenge of creating and maintaining an optimal portfolio of assets from thousands of options.**
- While liquid assets are of paramount importance to financial institutions, **the calculations for combinatorial optimization of assets have been too complex, costly and time-consuming to do often.**

Issues and motivation to be solved

- The vast array of options **promises to use quantum technology to create and maintain an optimal portfolio of assets**
- NatWest **designed a demonstration experiment to solve the combinatorial optimization problem of a financial portfolio at high speed using Fujitsu's quantum technology**

Problem setting as a quantum computer

- Calculated NatWest Bank's **high-quality liquid assets** * and **optimal portfolio composition for (HQLA)**
  - ✓ HQLA is an asset such as cash or bonds that all banks in the UK need to hold as a buffer in the event of financial difficulties
- The machine uses **Fujitsu digital annealer**

Expected business benefits

- Ability to **compute combinatorial optimization problems about 300 times faster** than conventional classical computers.
- The use of quantum technology will **make it possible to be accurate and reduce the risk of human error.**
- In addition, NatWest is expected to be able to complete a comprehensive risk assessment of the Bank's portfolio at a high speed and to **optimize the interest rate spread, which is the difference between the lending rate and the deposit rate, and reduce risk,** by enabling a much wider range of results and portfolio replacements than in the past.

*: A safe asset that can be easily sold in times of market stress. last line of defense for financial institutions in dealing with liquidity risk

Reference: Fujitsu Limited "Demonstration of "digital annealer" at Fujitsu and Royal Bank of Scotland group NatWest" (https://pr.fujitsu.com/jp/news/2018/10/23-1.html)

*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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