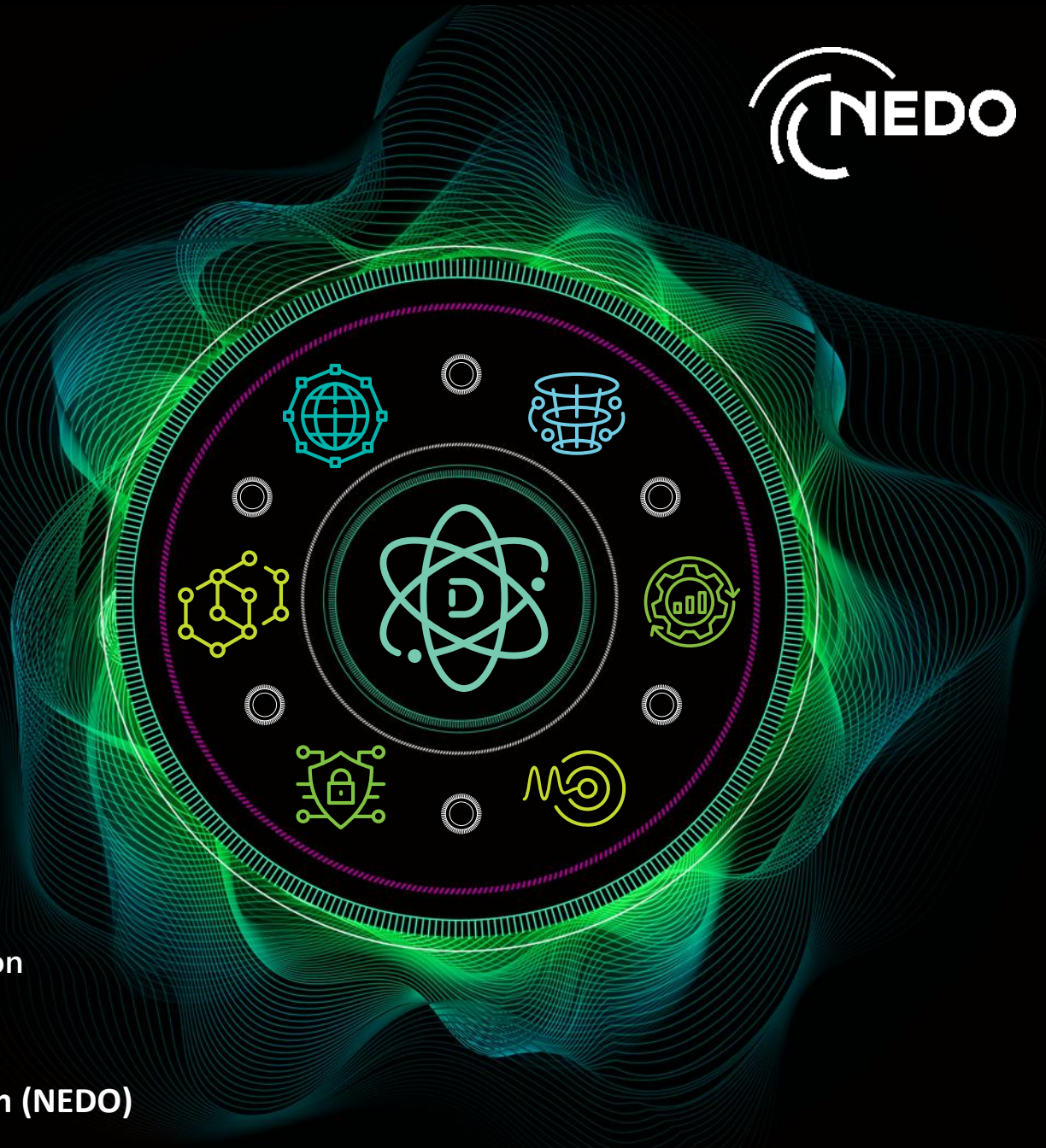
Quantum Computing Use Cases

Portfolio optimization for risk management of natural disaster



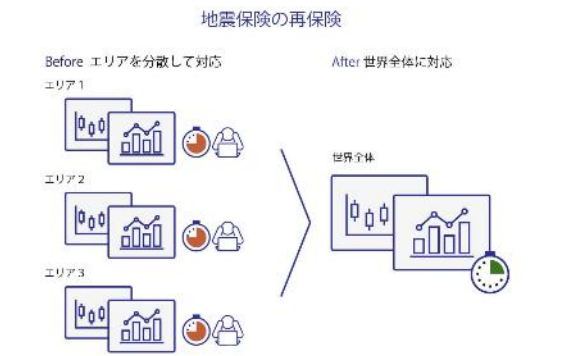
Combinatorial Optimization Problem

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New Energy and Industrial Technology Development Organization (NEDO)

【Validated】Portfolio optimization for risk management of natural disaster





Use Case Overview	Optimization of reinsurance portfolios for large-scale natural disasters.
Issues to be addressed and their effects	Maximizing profits commensurate with the risks assumed.
Contributions of quantum technology	Accelerating complex and large-scale computations.

Expected realization period	(Year)～2030
Industry classification	Information・Financial・Other services
Related QRAMI layers	Business layer
Related quantum technologies	Quantum-Inspired

Novelty	Some new elements
Difficulty of achievement	Difficult
Social contribution level	Contributions to society as a whole
Market size	100B～1T¥

Detail

Portfolio optimization for risk management of natural disaster

Key Challenges

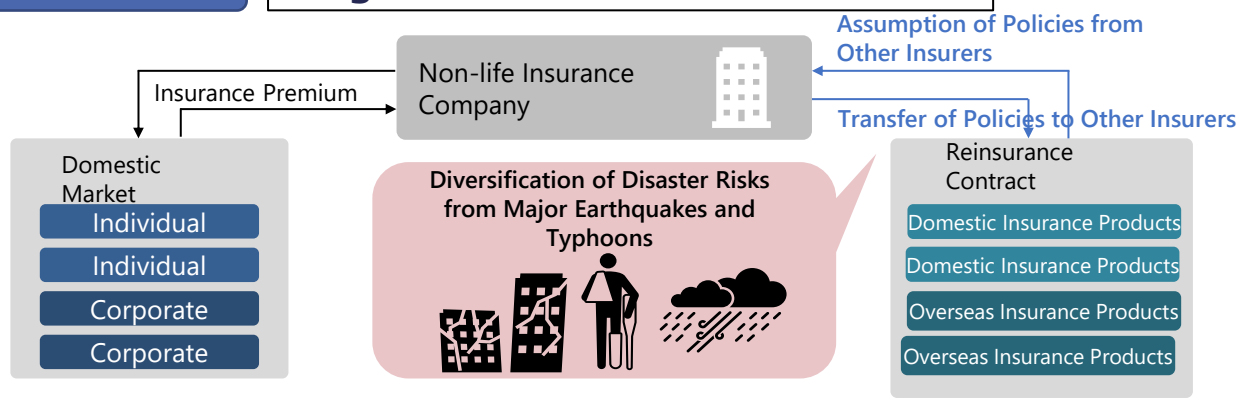
- In the short term: Increasing uncertainty in the business activities of client companies (policyholders and borrowers) due to the growing severity of natural disasters, as well as the hardening of the reinsurance market.
- In the medium to long term: Assessing and quantifying the impact of changes in natural disaster patterns caused by climate change, and the resulting changes in the risk profiles of investment and financing counterparties.

Overview of the Use Case

- Losses are correlated across contracts (or securities/assets).
- The risk metric is Value at Risk (VaR), representing a severe loss event that occurs only once every several hundred years.
- Identify a portfolio that maximizes expected returns while remaining resilient to extreme natural disaster events that may occur once every several hundred years.

Implementation Image

Target Realization Date: 2030



Expected Benefits

- Appropriate risk diversification that takes into account changes in natural disaster risks

Action Plan

QRAMI	Action
Business	Streamlining Optimization Processes through SaaS Adoption
Function	Acceleration of disaster scenario generation and simulations Semi-automation of model formulation using generative AI
Information	Accumulation and updating of data required for disaster scenario generation and simulations
Integration	Establishment of a computing environment that enables end-to-end execution from disaster simulation to optimization
Asset	Widespread adoption of annealing machines and cloud services

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

New Energy and Industrial Technology Development Organization (NEDO)
AI and Robotics Department (e-mail: quantum_ai@ml.nedo.go.jp)

This collection of use cases was obtained as a result of the work commissioned by the New Energy and Industrial Technology Development Organization (NEDO) "Cyber-Physical Development Business of Quantum/Classical Hybrid Technology/Study of Use Case of Quantum Technology" and the “Post-5G Information and Communications System Infrastructure Reinforcement R & D Project (Quantum Industrialization)/Comprehensive Study for Promoting the Industrialization of Quantum Computers ”.