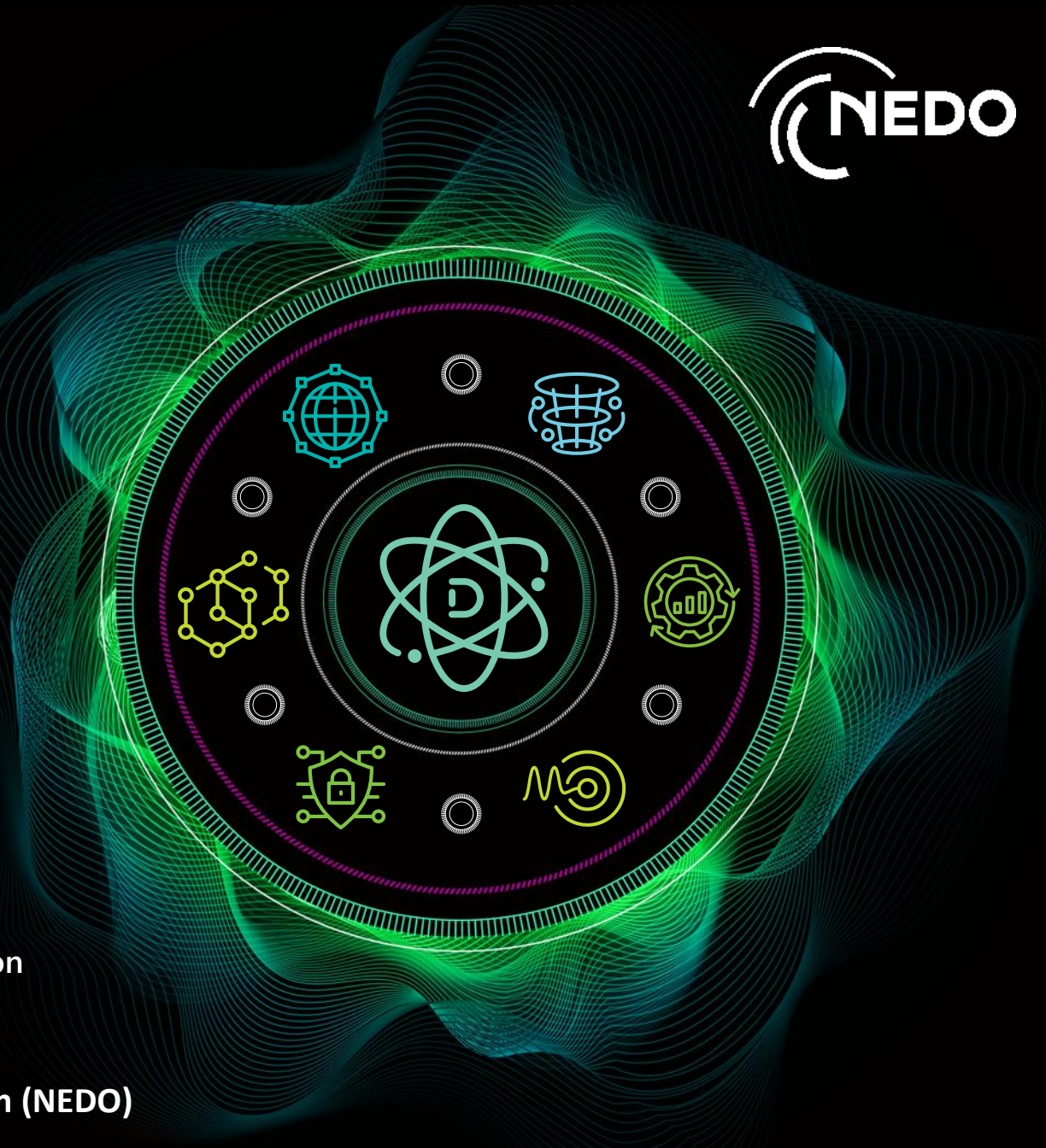
Quantum Computing Use Cases

Scheduling hundreds of workers

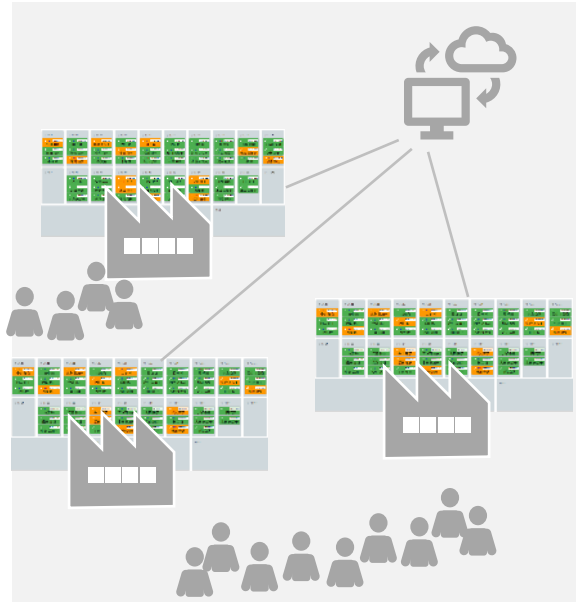


Combinatorial Optimization Problem

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New Energy and Industrial Technology Development Organization (NEDO)

【Validated】Scheduling hundreds of workers



Food Manufacturing Workforce Scheduling Concept

Use Case Overview	Delivers optimal solutions quickly by considering skill matching, workload balancing, and individual preferences
Issues to be addressed and their effects	• Difficulty to achieve high level employee satisfaction due to complex operational requirements • Enormous solution space as the number of employees and sites increase • Unpredictable schedule changes
Contributions of quantum technology	Quantum (inspired) computing can construct optimal workforce schedules, even for problems that are unrealistic to solve through manual planning or conventional optimization methods.

Expected realization period	2025
Industry classification	Manufacturing
Related QRAMI layers	Personnel Scheduling ICT
Related quantum technologies	Quantum Inspired Computer

Novelty	Mid
Difficulty of achievement	Mid
Social contribution level	Mid
Market size	Factory DX Market in JP-FY2024 ¥1.8 trillion

Scheduling hundreds of workers

Key Challenges

- Complex workforce requirements make it challenging to maximize employee satisfaction
- The solution space grows exponentially as the number of employees and locations increases
- Quick adaptation to sudden schedule changes

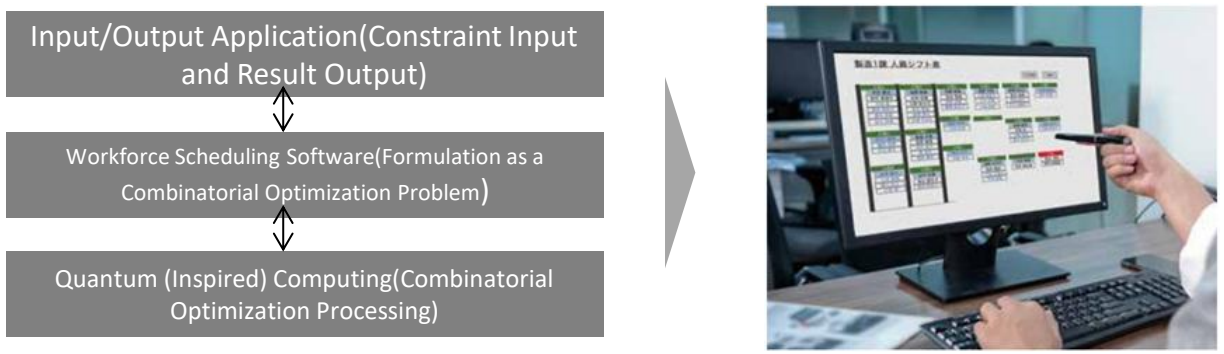
Overview of the Use Case

- Rapidly generates optimal schedules by taking into account skill matching, workload leveling, and individual preferences
- Provides optimal solutions quickly for problems that are too time-consuming for conventional optimization solvers

Implementation Image

Target Realization Date: 2025

Cloud-Based Workforce Scheduling Service



Expected Benefits

- Increase productivity through the reduction of workforce planning inefficiencies
- Expanding the service to include job matching could enable workforce optimization across multiple companies, helping alleviate labor shortages on a societal scale

Action Plan

QRAMI	Action
Business	Cloud-Based Workforce Scheduling Service
Function	Workforce Scheduling Software
Information	Know-how for formulating the diverse operational constraints and objectives required for workforce scheduling
Integration	Factory Digital Twin
Asset	Quantum (Inspired) Computing

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 ”.