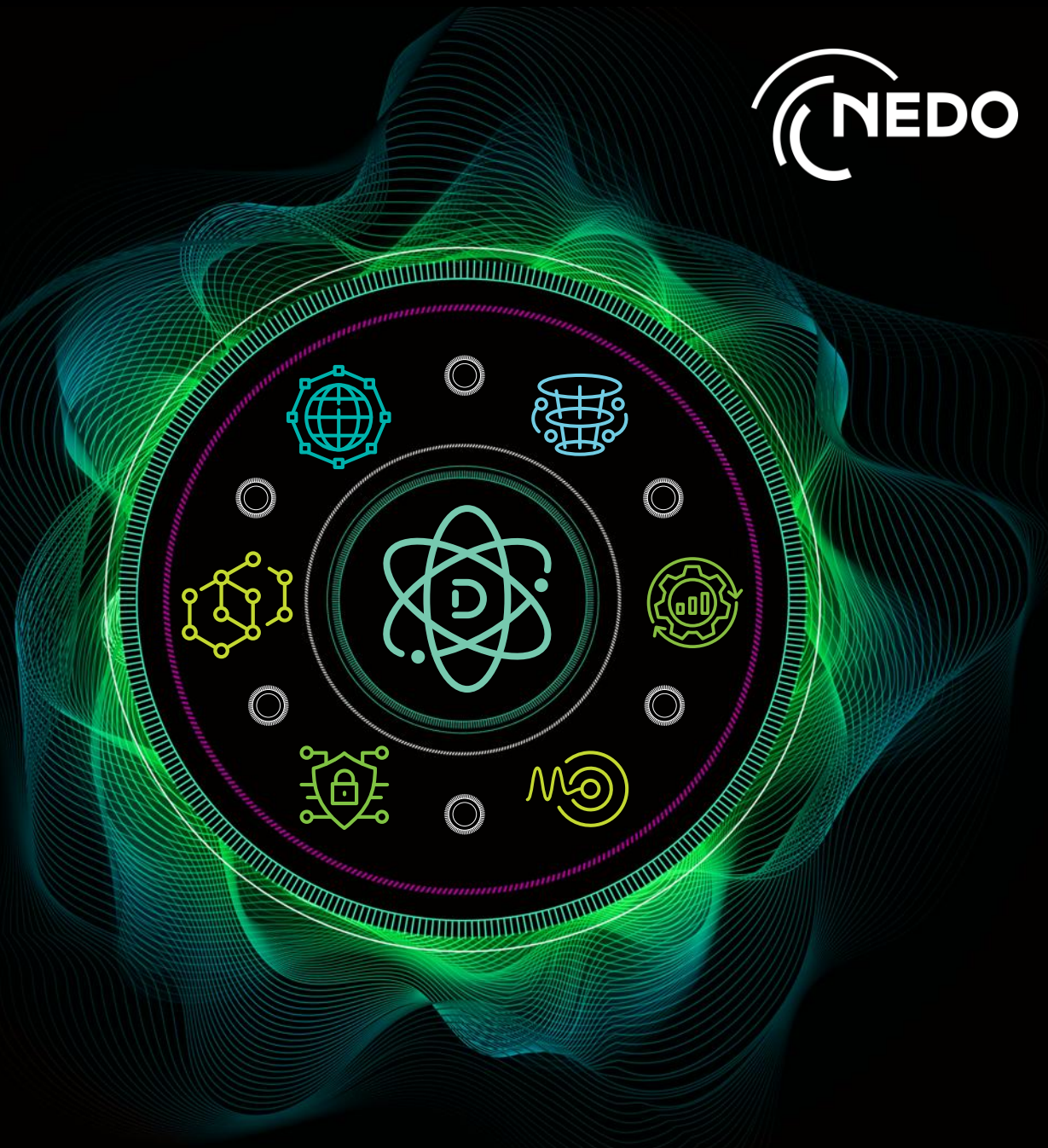
Quantum Computing Use Cases

Reducing travel distance for parts aggregation in warehouses

Fujitsu IT Products



New Energy and Industrial Technology Development Organization (NEDO)

Fujitsu IT Products: Reducing travel distance for parts aggregation in warehouses [2018/04] 1/2

Operational Use

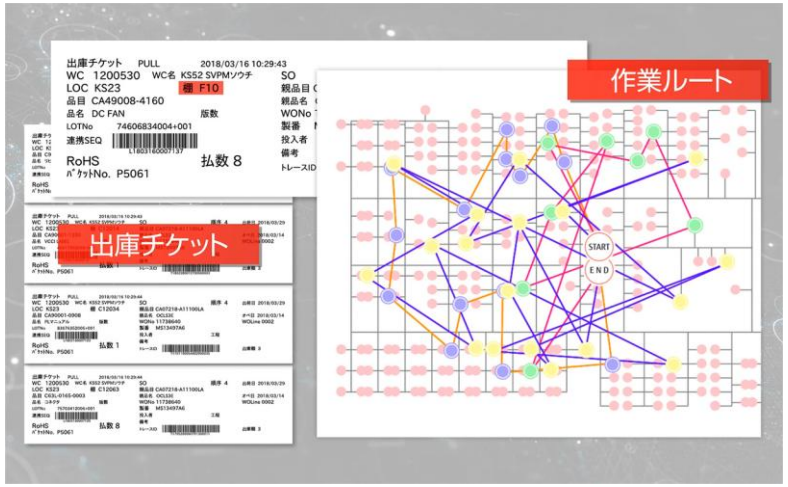
Industry	Discrete Manufacturing
Process	process design
Method	combinatorial optimization
Category	Ising*

Background

- Fujitsu IT Products manufactures mainframes, UNIX servers, core IA servers, medium and large servers such as supercomputers, and storage systems as Fujitsu's core computer system factory.
- Since its establishment in 2002, the company has been **promoting the rationalization of its production system** under the slogan of **producing a wide variety of products in small quantities** and under the slogan of "Improve customer satisfaction by pursuing QCD(Quality: Quality, Cost: Cost, Delivery: Delivery)"
- As a measure to increase productivity, we have been studying the possibility of utilizing digital annealer by **focusing on the optimization of flow lines in factories including warehouses**

Issues and motivation to be solved

- In warehouse operations, efficient parts picking depends largely on the experience of workers, and inexperienced workers have no idea which parts are on which shelf. **They have to look around the warehouse in vain, and picking takes a considerable amount of time.**
- In recent years, **we had to rely on the experience of veteran workers,** because we had to collect different parts each time because of the large number of kinds of parts delivered by small quantities.
- This time, we **planned to optimize the transportation route** using digital annealer at a Fujitsu IT Products warehouse



Issue ticket (parts list) and work route

Reference: Fujitsu Limited "Up to 45% reduction in travel distance for parts aggregation within warehouses" (https://www.fujitsu.com/jp/digitalannealer/case-studies/201804-fjit/)
*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.

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Problem setting as a quantum computer

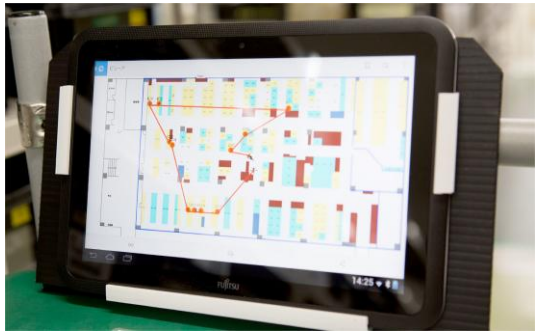
- **Calculate the optimal flow line for picking** at Fujitsu IT Products warehouse (**The area is 1000 square meters and 3000 parts are stored.**)
- A simple single stroke is used as the optimum flow line for picking, and the flow line is visualized on a tablet.
- The machine uses **Fujitsu's quantum-inspired digital annealer**

Expected business benefits

- As a result of the demonstration, the travel distance for collecting parts was **reduced by 20% per month compared with manual labor**.
- And by repositioning shelves, **we expect to see a decrease of up to 45% per month.**
- Rather than telling workers that the flow line has become shorter with just their mouths, it is assumed that by visualizing it on a tablet and letting them know the effect concretely, they will change their consciousness to further improve work efficiency.



Fujitsu IT Products warehouse



displayed on the tablet
optimal picking route

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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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