

Social Innovation through Digital Transformation

The Fujitsu Group is committed to creating new value to realize its Purpose:
“To make the world more sustainable by building trust in society through innovation.”

We are working with partners who have specialized knowledge and expertise, and are taking on the challenge of leveraging leading-edge digital technology to solve social issues like the fight against disease, the reduction of greenhouse gas emissions, and the prediction of disasters to minimize their impacts.



Contributions in Drug Discovery and the Medical Field

While the worldwide vaccination rates for COVID-19 increase, the emergence of variants has made it difficult to predict how the disease situation will unfold.

The Fujitsu Group is contributing to the fight against COVID-19 through innovations in drug discovery and novel medical treatments, realized through digital transformation (DX).

Computing Power to Support the Fight against COVID-19

The fight against COVID-19 has demonstrated the possibilities and importance of digital technology to our society. AI and machine learning technologies have enabled the development of vaccines at unprecedented speeds. People worldwide anticipate the promising, transformational potential of digital technologies to contribute to the development of new therapeutic drugs and the expansion of telemedicine services, to not only help us fight against the COVID-19 pandemic but to make our society more resilient in the years ahead.

With Healthy Living as one of its Key Focus Areas, the Fujitsu Group is drawing on digital technologies to mitigate the spread and damage of COVID-19 while driving research and development in the search to find new treatments.

The supercomputer Fugaku, for example, represents one of the most powerful platforms in the global fight against COVID-19, and was jointly developed by the research institute RIKEN and Fujitsu. The computing power of Fugaku has been utilized in exciting research projects that have fundamentally changed our understanding of the virus, conducted by institutions like RIKEN, including for projects to discover therapeutic drug candidates, the prediction of virus droplet infection in indoor environments and countermeasures, and evaluation models to measure the impact of the spread of the disease and city lockdowns on socioeconomic activities.

Transforming the Development Process of Middle-Molecule Drug Discovery

Fujitsu proved its exceptional hardware development capabilities with its driving role in the development of the world's most advanced computing technology for the supercomputer Fugaku.* However, Fujitsu's strength is not limited to hardware. Fujitsu's competitive advantage also lies in its ability to combine computing technologies with software development and system integration to provide customers with services that realize innovation and create social value that the Fujitsu Group aims to achieve.

One of our latest initiatives to combine technology and service is a joint project with a venture company to innovate drug discovery processes. Together with our partner PeptiDream Inc., which has unique technologies in the field of middle-molecule (peptide) drug discovery, we take on new challenges for innovation. Through our joint research, we have succeeded in the rapid and accurate calculation of the stable structure of middle-molecule compounds, which had been extremely difficult using conventional simulation technology.

In this joint research, Fujitsu successfully proposed mechanisms to improve efficiency in the drug discovery process based on high-performance computing and its quantum-inspired Digital Annealer technology, which allows users to rapidly solve combinatorial optimization problems that prove difficult to solve using current conventional computers.

Based on the results of this joint research, we are also working on the development of therapeutics to treat COVID-19. In November 2020, the five companies PeptiDream, Fujitsu, Mizuho Capital Co., Ltd., Takenaka Corporation, and Kishida Chemical Co., Ltd. established the joint venture PeptiAID, aimed at the development of therapeutics to treat coronavirus diseases. Fujitsu provides its knowledge in computing technology and will also take up the challenge of establishing a new foundation for the drug discovery process through digital transformation, by utilizing AI-based prediction of activities and physical properties, and creating a drug discovery IT infrastructure that helps researchers to share knowledge and utilize research data.

* Press release on June 28, 2021: "Japan's Fugaku Retains Title as World's Fastest Supercomputer for Three Consecutive Terms."

<https://www.fujitsu.com/global/about/resources/news/press-releases/2021/0628-01.html>

For more information about PeptiAID, please visit the following website.

<https://www.fujitsu.com/global/about/resources/news/press-releases/2020/1112-01.html>

Contributing to the Mitigation of Climate Change

Amid accelerating efforts to combat climate change, the Fujitsu Group is promoting advanced digital technologies to drive social innovation and create new value. Fujitsu aims to contribute to a carbon-neutral society by addressing climate change through “mitigation measures,” which focus on the reduction of greenhouse gas emissions, as well as “adaptation measures,” which aim to prevent and reduce damage inflicted by natural disasters.

Improving the Efficiency of Large-Scale Logistics Services Using the Digital Annealer

In recent years, the importance of logistics as part of the social infrastructure underpinning people's lifestyles and industrial competitiveness is steadily increasing. At the same time, however, we are facing issues like shortages of drivers and a rapid increase in logistics costs in Japan due to small-lot and high-frequency deliveries amid the rapid growth of the e-commerce (EC) market. Measures to improve efficiency and reduce costs are also required in traditional areas like the logistics management of components in the manufacturing industry as a fundamental part of the supply chain. Increasing logistics and traffic density are factors that further increase CO₂ emissions, which may negatively impact climate change and lead to more severe and frequent weather disasters. In order to contribute to solving such challenges of the logistics

industry, Toyota Systems and Fujitsu have conducted joint trials to optimize the distribution network of automobile components by utilizing Fujitsu's quantum-inspired Digital Annealer technology.

When planning logistics in automobile manufacturing, there are countless possible route options for purchasing parts from various suppliers, which must pass through relay warehouses and deliver parts to several suppliers. To optimize logistics in automobile manufacturing, it is necessary to identify routes with the lowest logistics costs out of a huge number of potential candidates. To find the optimal solution, one must take into account the maximum load capacity of vehicles, cargo volumes, designated delivery times, travel distances and times between destinations, as well as the time required to load and unload cargo. However, with a growing number of vehicles and destinations, the number of combinations increases exponentially, making it extremely

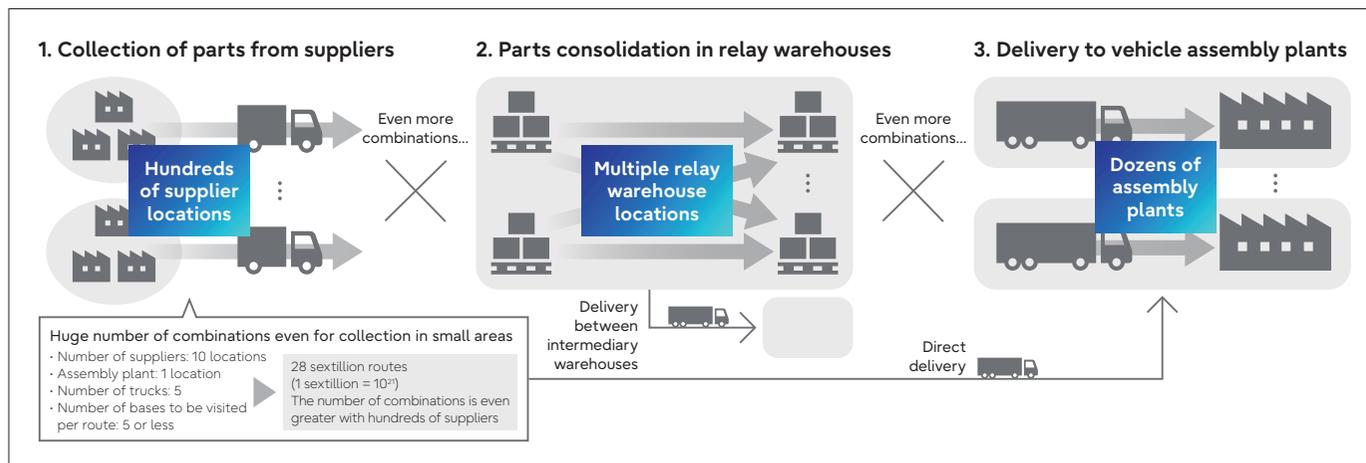
difficult for people to calculate the best answer. Fujitsu's quantum-inspired Digital Annealer is able to deliver optimal solutions to such problems at high speed.

Contributing to the Reduction of CO₂ Emissions

Within the trials, we succeeded in calculating new routes from a wide number of possible options within 30 minutes, contributing to a material reduction in overall logistics costs. Trials showed that customers can achieve cost reductions of approximately 2% to 5% compared to conventional methods by applying our technology to optimize their logistics routes. We also confirmed that optimizing logistics routes can reduce CO₂ emissions from trucks by 8.9% compared to conventional methods (based on research by Fujitsu*).

Moving forward, we aim to optimize the entire supply chain by applying technologies like the Digital Annealer to actual logistics operations, while simultaneously promoting further verification and practical applications to expand the scope of real-world use to contribute to the mitigation of climate change.

* Fujitsu developed the web estimation tool EcoCALC, to measure the reduction of environmental impact achieved through the use of the Digital Annealer by comparing CO₂ emissions levels before and after deployment. The calculation method is based on the International Telecommunication Union-Telecom (ITU-T) recommendation L.1410 for the methodology for environmental life cycle assessments of information and communication technology goods, networks and services (2012).



For more information about EcoCALC, please visit the following website:
<https://www.fujitsu.com/global/about/environment/sustainability-contribution-certification/>

Contributing to Efforts to Adapt to Climate Change

Every year, torrential rains and typhoons cause damage to homes and roads and claim many lives in Japan and other countries. As damages caused by climate change are expected to further increase in the future, the Fujitsu Group is promoting DX-based innovation to reduce the risk of flood damage and to ensure the safety of people. Through “adaptation measures,” Fujitsu will contribute to creating resilient communities and combating climate change.

AI Water Management Prediction System for Flooding Countermeasures

The number of disasters caused by floods globally has been on the rise since 1980, while the trend is increasing in recent years. In Japan, economic losses due to flood damage caused by Typhoon No. 19 in 2019 were approximately ¥1.65 trillion, the largest in the world. Damage caused by climate change, including flood damage, is becoming more frequent and severe. As rivers often overflow in a short period of time during floods, it is difficult to take precautions in advance. In addition to weather forecast information, local governments thus increasingly require real-time data to predict the influence of further rainfalls on the water level of rivers when issuing evacuation advisories to local residents.

Fujitsu’s AI Water Management Prediction System, launched in March 2021, meets these challenges by utilizing a model that incorporates insights from hydrology. The system can be used to predict water levels in smaller and medium-scale rivers with limited measurement data or for areas where water level sensors have been newly installed and have yet to accumulate sufficient data. These predictions will offer authorities a tool for delivering faster response times and mitigating flood damage in the event of a natural disaster, including dispatching personnel to affected areas and supporting appropriate decision making in issuing evacuation advisories. Such support also contributes to “adaptation” to the progressing effects of climate change, by protecting people from weather-related disasters such as river floods caused by heavy rains.

Ensuring Evacuation Lead Times Based on Forecasts

Using this system, AI predicts water levels based on collected observation data, enabling predictions of water levels of relevant rivers based on the expected rainfall upstream. This helps authorities make more accurate evacuation advisories, dispatch personnel to affected areas more appropriately, and deliver faster response times to prepare evacuation centers in the event of floods. The ability to predict risks in advance not only enables the preparation of appropriate action plans but also can further contribute to reducing greenhouse gas emissions by avoiding the waste of various energy resources.

Through this system and other AI-based solutions that can provide forecast information at various locations, the Fujitsu Group aims to reduce the risk of damage from natural disasters like river floods resulting from climate change. We will continue to contribute to the creation of a resilient society and the adaptation to climate change by promoting disaster prevention and mitigation in the event of natural disasters in cooperation with local communities, local governments, and businesses.

