

CASE STUDIES FOR VALUE CREATION

Example 1 Healthcare in the IoT Era

Using ICT to Realize a Society That Promotes Health and Longevity



Since the 1970s, Fujitsu has been advancing the use of ICT in the field of medical care. Now, with the arrival of the IoT era and the proliferation of supercomputers, we have taken up a new challenge of realizing a society that promotes health and longevity.



Hirofumi Gouda
Head of Fujitsu's Next-Generation Healthcare Innovation Center, Corporate Executive Advisor

Using the Power of ICT to Enhance People's Quality of Life (QOL) and Realize a Society That Promotes Health and Longevity

In Japan, controlling medical costs and dealing with a shortage of physicians have become issues due to a declining birthrate and the rapid aging of society. We at Fujitsu are using ICT to advance information links between home health information and medical and nursing care. Furthermore, we are constantly considering how ICT can be used in the field of healthcare, such as with genome medical research based on genetic information, medical care big data utilization, and new medical technology development through supercomputers.

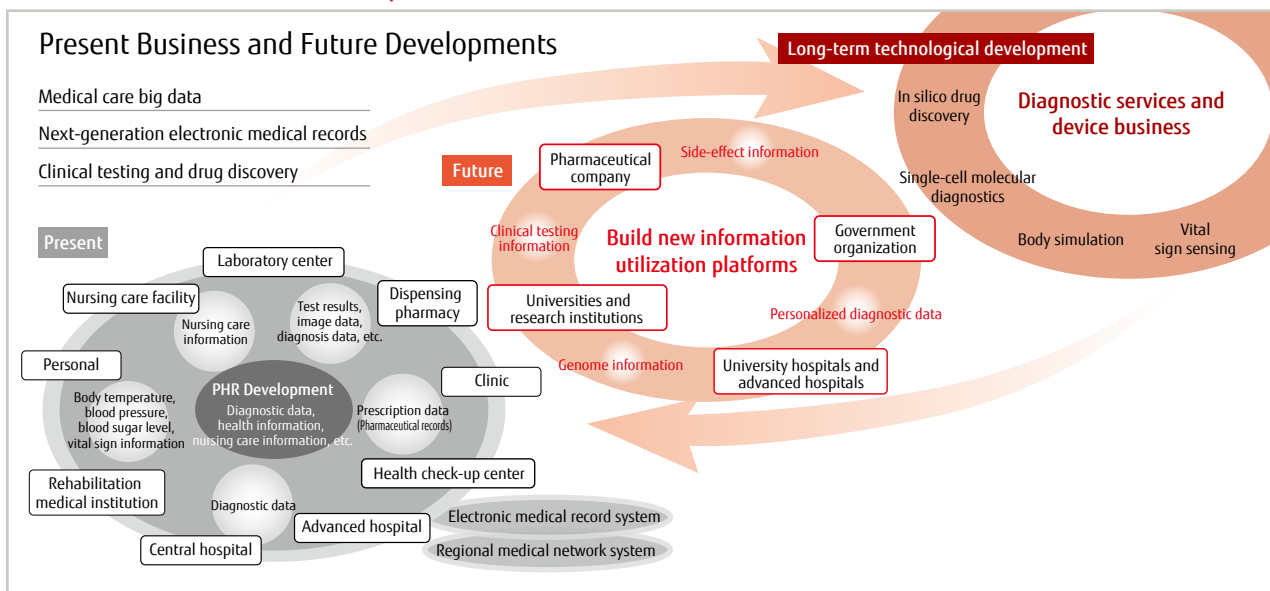
Fujitsu entered the medical field in the 1970s by providing medical accounting systems, and went on to develop electronic medical records and regional healthcare information exchange systems. ICT has contributed to resolving many challenges in the medical field. Now, Fujitsu is providing ICT solutions using the

expertise it has cultivated in the healthcare domain, and it is focusing on driving innovation with an eye to the future.

One of these initiatives is the Next-Generation Healthcare Innovation Center, established in December 2013. Actively working to create new value, the center focuses on collaborating with medical and research laboratories both in Japan and abroad to leverage ICT for health enhancement, early detection of diseases, prevention of serious illnesses, creation of new medical treatments based on gene analysis, and discovery of new drugs. It is also utilizing an IoT platform with a large number of sensors with the goal of creating environments where seniors can live independently in safety.

To extend not only life but also "healthy life," meaning a long life in good health, Fujitsu will use the power of ICT to enhance people's QOL and realize a society that promotes health and longevity.

Present Business and Future Developments of ICT in the Healthcare Field



Case Study Using Sensing Data for Early Detection of Hidden Motor Function Abnormalities

Since 2013, Fujitsu Laboratories and Fujitsu have been working together with Irish research institutes CASALA and INSIGHT@UCD on the KIDUKU Research Project on assisted independent living for seniors and patients who live in smart houses in Ireland.

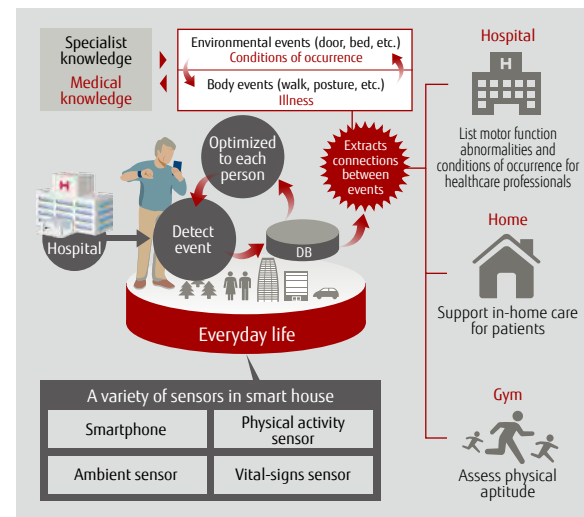
In March 2015, as one result of the research, Fujitsu and its partners developed a technology for early detection of abnormalities in motor function that might otherwise go undetected. This technology uses data collected from sensors worn by the seniors and patients, as well as from sensors embedded in the smart houses.

The technology quantifies the characteristics of an individual's actions such as "walk" and "open door," and detects movements that easily show signs of abnormal or irregular motor function that are not easy to observe. Using the technology enables detection of individual risks hidden in daily activities. For example, a patient who walks with a limp may be prone to loss of balance when walking immediately after getting out of bed.

Individually optimized care is enabled in line with such risks and is expected to lead to better diagnoses and treatment by physicians and more efficient clinicians, as well as more reasonable medical expenses.

In the project, Fujitsu is aiming for practical implementation

of the technology in fiscal 2017, with plans to proceed with verification of various illnesses and applications beyond the smart house. Fujitsu also aims to apply the technology to various services, such as risk action proposals tailored to individuals and operational support for healthcare professionals, and to develop next-generation healthcare support systems that combine the technology with electronic medical record systems.



Case Study In Silico Drug Discovery Aiming for Breakthroughs in New Pharmaceuticals Development

Expectations are high that new drugs will be developed for illnesses without an effective treatment, such as Ebola fever which spread through West Africa in 2014. Under these circumstances, Fujitsu is working on IT-based drug discovery using computers to design and evaluate low-molecular-weight drug candidate compounds.

New drugs enter the market after passing through the four stages of target exploration; compound design, synthesis, and evaluation; preclinical testing; and clinical testing. The probability of a candidate compound making it through this process and becoming a new pharmaceutical product is about 1 in 30,000. Generally, drug development can take some 9 to 17 years and cost 20 billion yen. Patients and others hoping for new medicines are strongly demanding that this process be improved.

Fujitsu has been working on a drug discovery project targeting cancer using a supercomputer in collaboration with the University of Tokyo's Research Center for Advanced Science and Technology and a pharmaceutical company since 2011. The aim of this research is to discover a new compound that

would strongly bind to a protein thought to cause the disease, suppressing its function. Achieving such a discovery could greatly expand the potential for the creation of new drugs.

Going forward, Fujitsu will provide simulation technologies utilizing supercomputers like the "K computer" to continue development of new pharmaceuticals through IT-based drug discovery, and contribute toward the realization of a society where people enjoy good health.



Example 2 Manufacturing in the IoT Era

Bringing Innovation to Manufacturing with Big Data



As an ICT vendor with practical experience in manufacturing, we strive to lead a transformation of manufacturing for the era of the IoT (Internet of Things) while leveraging Japan's strengths in this field.



Toshio Hirose
Corporate Executive Officer, SVP,
Head of Manufacturing Industry Business Unit,
Manufacturing & Distribution Industry Sales Group

Using ICT to Create a Production Environment for Human-Robot Cooperation based on Our Own In-House Deployments

Amid an escalating rivalry for leadership by countries around the world seeking to revive their manufacturing sectors, such as with Industry 4.0 in Germany and the Industrial Internet in the US, Fujitsu is putting ICT to use in its efforts at "next-generation manufacturing."

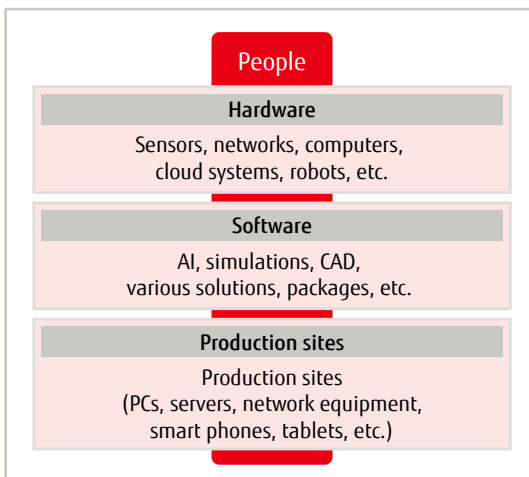
At the heart of this next-generation manufacturing are the two main elements: virtual product manufacturing and real-world-based "smart manufacturing." Fujitsu has production sites that combine expertise in both hardware, such as sensors and cloud systems, and software, such as production control solutions and AI. It also has human resources to support the sites, and is using the total capabilities amassed from all of these assets to drive next-generation manufacturing.

For example, by coordinating the data acquired from the IoT and the people involved on the front lines of manufacturing, it is

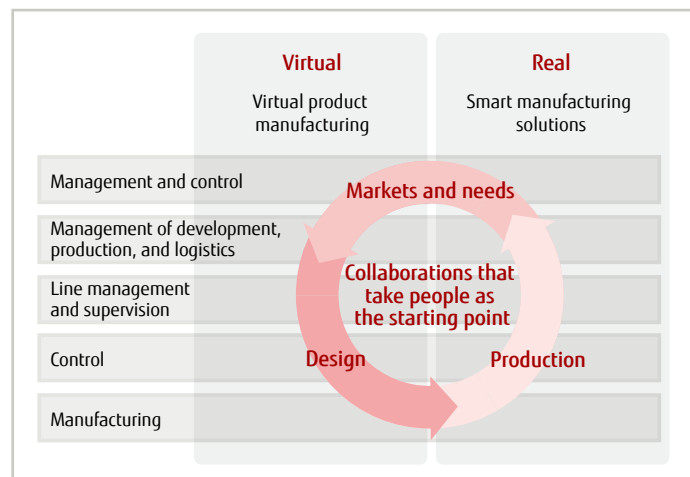
possible to realize small-lot mixed-flow production of multiple items, which was difficult to achieve with a conventional conveyor production system, resulting in higher-quality items being produced in half the time. In addition, by using improvements at production sites to repeatedly refine the optimization obtained through virtual computer simulations, we are evolving a new model for manufacturing where people and robots grow together every day.

Fujitsu is developing first-hand experience of utilizing ICT, big data, and the IoT, mainly at its PC manufacturing plant (Shimane Fujitsu Limited), which received the 6th Monodzukuri Nippon Grand Award METI Minister's Award. The expertise, methodologies, and tools accumulated at this plant will serve as a reference model for making proposals to customers. Based on our own experience as a manufacturer, we will identify the real issues implicit in our customers' manufacturing systems and improve them, working alongside them to expand business and realize a better and more vital manufacturing sector overall.

Fujitsu's End-to-End Manufacturing Capabilities



Next-Generation Manufacturing Solutions



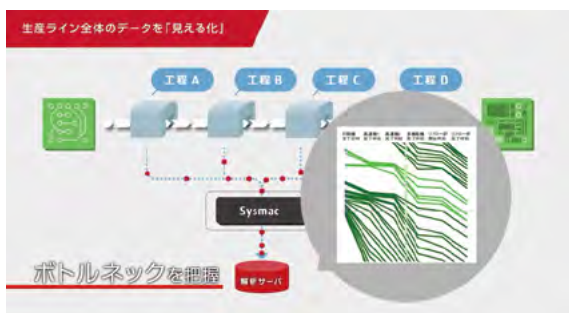
Case Study Visualizing Data to Realize a New Era of Manufacturing Where People and Machines Work Together (OMRON Corporation)

OMRON Corporation, a world leader in industrial automation, had been taking steps with a view to utilizing big data obtained from its Sysmac Automation Platform for integrated control of production line equipment. Determining just how to leverage the collected data, however, had become a challenge.

Fujitsu integrated the diverse data collected by Sysmac to visualize the production line of OMRON's Kusatsu Factory. This has enabled anyone to identify the cause of errors and remedy them in around one hour, and it significantly contributed to increased productivity. Fujitsu also made several proposals focused on overall optimization of the production line, resulting in an approximately 30% increase in the production

rate over several months. Visualization provides a new starting point for improvements. It has realized a completely new way to innovate at manufacturing sites that enables the people that support manufacturing on the factory floor to work together in harmony with machinery, leading to improved productivity. Currently, OMRON is developing the same system for overseas factories, aiming to improve productivity and quality globally.

Fujitsu will continue to promote the use of data, realizing and supporting "next-generation manufacturing where people and machines work together in harmony" to improve performance at manufacturing sites.



Case Study Driving the Maker Movement for Long-Lasting Innovation (TechShop, Inc.)

TechShop, Inc. provides "spaces for makers." It offers a wide range of fabrication machinery and tools, such as 3D printers, to a variety of people, including entrepreneurs, designers, and students, in a place where innovation is promoted by making things. Through this initiative, TechShop has been a pioneer of the "Maker Movement" that has captured the public eye, and now operates workshops in eight cities throughout the US. The company is also expanding overseas, starting with France and Dubai. Fujitsu and TechShop subscribe to the same philosophy, and the two companies signed a partnership agreement under which they launched in the US in December 2014 the world's first mobile, open workshop, "TechShop Inside! – Powered by FUJITSU," which provides the experience of making things to children. They continued their initiatives in October 2015 with the joint establishment of TechShop Japan Limited, which aims to help create new projects and to support and expand businesses in Japan through open innovation. Through its participation in the TechShop Tokyo facility

(opening planned for 2016), Fujitsu will continue to lead the creation of ecosystems for open "making" by involving communities as well as encouraging collaborative creation between members.



Example 3 Toward Next-Generation Mobility in the IoT Era

Creating the Future's Mobility Society to Connect People, Cars, and Society



Countries around the world are facing different problems and issues depending on their transportation culture, with emerging countries dealing with traffic congestion, road accidents, and environmental pollution, and advanced countries working to update their regional traffic systems. Fujitsu is taking action to provide solutions to these issues with ICT.



Motoyuki Ozawa
Corporate Executive Officer
SVP, Vice Head of Manufacturing & Distribution Industry Sales Group
(In charge of Automotive Industry Business)

Providing Information Collection and Utilization Services as an ICT Platform for "Connected" Cars

Advancing urbanization around the world has given rise to a host of transportation-related problems. New cities are faced with a complex mix of interrelated social issues such as chronic traffic congestion, road accidents, and environmental pollution from exhaust gas. Meanwhile, mature cities need to optimize their regional transport systems due to evolving population trends.

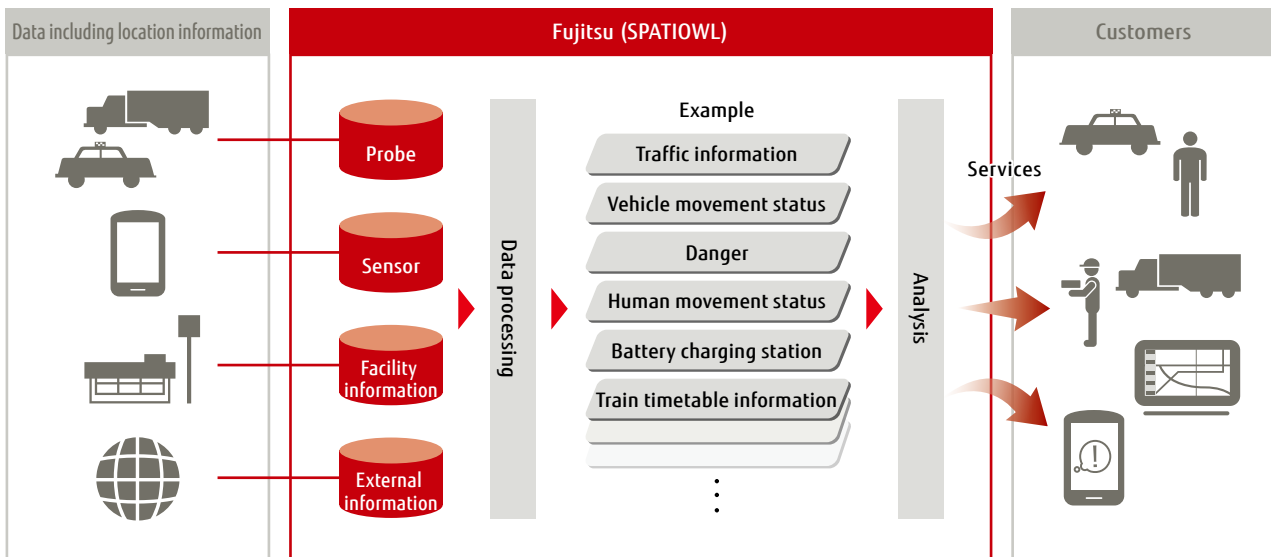
Fujitsu is using ICT to solve these complex problems. We aim to realize a mobility society in the IoT era, in which people, cars, and all other aspects of society are connected.

As a first step, we have provided the FUJITSU Intelligent Society Solution SPATIOWL as a mobility platform service that collects and utilizes vehicle traveling information and sensor information. This serves as an ICT platform for realizing "connected" cars that exchange information between vehicles and also with devices outside of the vehicle. We are developing the service in emerging countries' cities, for example, where it is used for guiding cars off

non-toll roads and onto expressways in the crowded Indonesian city of Makassar, and we are looking at introducing it to alleviate traffic jams in central Bangkok, Thailand. In addition, we are considering provision of new services utilizing the traffic data accumulated by SPATIOWL and added-value services other than traffic services that combine location and area information.

In cities with mature transportation systems in Japan, the US, and Europe, we are working to provide new transportation services from the perspective of sustainable city creation. We are also cooperating with research institutes on projects such as the development of "multi-modal route planning" that displays the optimal routes depending on changing conditions, and of on-demand transportation technology that realizes a mobility environment that does not rely excessively on private vehicle ownership.

Fujitsu will continue to promote the fusion of vehicles with ICT, working to realize a society with next-generation mobility that is safe and comfortable.



Case Study Fujitsu Provides Its SPATIOWL Traffic Information Service to Relieve Urban Traffic Congestion in Indonesia

In Indonesia, frequent traffic congestion and accidents have become a social issue in densely populated urban areas. Chronic traffic congestion has a significant impact on society, delaying the distribution of goods and services and polluting the environment, creating the need for a solution.

Fujitsu provided SPATIOWL to PT. Marga Utama Nusantara, a toll-road management company in Indonesia, to promote use of toll roads to relieve traffic congestion. A dedicated app is installed on the smartphones of the company's staff patrolling toll roads and local roads in cars around-the-clock. Every minute this app sends data to SPATIOWL, including vehicle

location and speed. This data will be integrated and displayed as traffic information at toll-road entrances and other major locations to guide drivers from local roads to toll roads. Moreover, by analyzing data accumulated in SPATIOWL, Marga Utama Nusantara can consider new services to encourage further use of toll roads, such as limited-time discounts. Fujitsu will continue to use location-based information in various fields to create new services.



Case Study Start of Hydrogen Station Information Management Service to Support the Spread of Fuel Cell Vehicles

Amidst concerns over environmental issues such as air pollution and global warming, expectations continue to grow for hydrogen as a reliable source of energy due to its potential to reduce CO₂ emissions to zero. In particular, fuel cell vehicles (FCV) are expected to lead to reduced greenhouse gas emissions and solutions to energy challenges, as the fuel cells that they use generate electricity via the chemical reaction between hydrogen and oxygen, the only emission produced being water.

One issue to be addressed in the popularization of FCVs is the lack of infrastructure, with only a limited number of hydrogen stations available for refilling the fuel cells. To answer this challenge, Fujitsu has launched the Hydrogen Station Information Management Service, which uses SPATIOWL to provide real-time information on the locations and operational status of fueling stations. Toyota Motor Corporation makes use of this service to provide users of its FCV, MIRAI, with a car navigation system application called Hydrogen Station List, and a

smartphone app called Pocket MIRAI, aiming to achieve “secure, safe, comfortable, and convenient” automotive lifestyles.

Looking ahead, Fujitsu will continue to enhance its services, such as by adding a function enabling hydrogen station information to be registered automatically. By making it even easier to participate in the FCV ecosystem, Fujitsu is helping to promote the further spread of hydrogen energy.

