Fujitsu's Activities to Support Digital Transformation

● Yuji Kunii ● Takashi Hasegawa

The development of IoT, big data, and AI is accelerating the Fourth Industrial Revolution movement around the world. In Japan, the Ministry of Economy, Trade and Industry announced a framework for industries to follow under the title of "Connected Industries" in March 2017. An increasing number of companies are moving ahead with digital transformation, which is the creation of new systems connecting people, things, and companies with digital technology. To achieve digital transformation, system needs have changed from systems for recording operational transactions (systems of record: SoR) to systems for creating businesses (systems of engagement: SoE). To provide stronger support for and accelerate customers' digital transformations, Fujitsu attempted to reorganize its system integration (SI) department in 2017 and integrated technologies and human resources that had been dispersed across individual sites to strengthen its capabilities to deal with digital and global business. This paper describes Fujitsu's approach to digital transformation in the manufacturing and distribution industries.

1. Introduction

Recent advances in the IoT, big data, and AI are accelerating the spread of the Fourth Industrial Revolution around the world. In Japan, the concept of "Connected Industries" was announced by the Ministry of Economy, Trade and Industry (METI) in March 2017 as a framework for industries to follow.[1)] The idea behind Connected Industries is to interconnect all kinds of industries, companies, people, machines, and data with the aim of creating new added value through AI and other advanced technologies and solving pressing social problems such as labor shortages and environment/energy limitations.

In this way, an increasing number of companies are now working toward a digital transformation that will connect people, things, and companies by digital technologies and create new operating mechanisms. Such a digital transformation is being accompanied by a major change in a company's needs for systems from systems of record (SoR) that record business transactions to systems of engagement (SoE) that create business.

Fujitsu has accumulated knowledge of industry and business through its construction of customer systems in a wide range of industries. Looking to the future, Fujitsu believes that it can support its customers in a variety of fields through the use of advanced technologies such as AI and IoT and by technologies for processing today's explosive increase in data.

This paper describes Fujitsu's activities to support digital transformation in the manufacturing and distribution industries.

2. Change in market needs of manufacturing and distribution industry

The systems integration (SI) market in Japan and overseas is expected to undergo robust growth centered about the manufacturing industry and distribution and services industry. Specifically, the forecast is for a decrease in conventional client/server-type SI and an increase in SI using the cloud, mobile services, and big data.

The needs of customers' systems are also changing. In addition to conventional SoR, the focus is now turning to SoEs that use advanced technologies such as SMACS (social, mobile, analytics, cloud, sensor or security) and AI for connecting customers and companies

and creating business. In this section, we introduce the main needs of the manufacturing industry, distribution and services industry, and new business areas created by connecting the above (**Table 1**).

2.1 Manufacturing industry

1) Optimizing factories and supply chains

As consumer needs become increasingly diversified, the need has been growing for mass customization that can achieve high productivity and short lead times while meeting the needs of the individual consumer. However, achieving mass customization requires more than simply optimizing operations within the factory—there is also a need to optimize the entire supply chain outside the factory. This calls for a mechanism that can share information in a timely manner between factories and across companies.

Productivity within the factory must also be improved. As the performance of IoT devices increases and their cost drops, it is becoming possible to collect all sorts of information such as the status of manufacturing processes and state of facility operations as well as the movement of workers. This information is being increasingly used not only to improve processes and make them more efficient but also to manage devices and facilities, perform preventive maintenance, and improve productivity.

2) Supporting workers and raising efficiency

In Japan, a shrinking labor force and insufficient number of people ready to inherit know-how has become a major social problem. This state of affairs has generated a need for using ICT to support and automate work that has traditionally been performed by people. As part of this trend, there is a movement to provide workers with useful information in an easy-to-understand manner using augmented reality (AR) and virtual reality (VR) technologies.

There are also high hopes for AI as a technology for supporting the work of people. One field that AI can excel in is image analysis for quickly recognizing a target object from a large volume of image data. The application of image recognition using AI to evaluate design drawings and images of products and facilities is also progressing.

2.2 Distribution and services industry

1) Improving accuracy of demand forecasting

The application of ICT to business is accelerating and ever-increasing amounts of diverse business data are being stored. Using AI to make best use of this big data is expected to make business all the more efficient and accurate.

In particular, there is a great need in the food industry to improve accuracy in the demand forecasting operation. If demand forecasts are missed, foodstuffs cannot be shipped, resulting in waste that must be disposed of, which drives up costs. Meanwhile, in the distribution industry, a lack of drivers and an increase in the number of packages to be delivered are becoming serious problems. Progress is being made to solve these problems by using AI to improve the loading ratio of transport vehicles and optimize delivery routes by forecasting distribution flows.

2) Marketing and settlement

The popularity of social media driving word-of-mouth communication, photo sharing, etc. and the diversification of sales channels are making the behavior and motivation of consumers increasingly complex.

Table 1
Needs of customers' systems.

	SoR and Advanced Technologies (application to existing business)	SoR and SoE Linking (digital platform)	SoE (new business areas for customers)
Manufacturing	• Advanced factories using IoT and AI (smart factories) • Use of robots and drones	• Information sharing across companies • Advanced supply chains	• New business creation (sharing businesses, matching services) • ICT infrastructure supporting automated driving • Co-creation and use of the latest technologies
Distribution and services	• Use of big data and AI • Demand forecasting, distribution optimization	• Use of settlement, IoT, and web information • Consumer behavior/motivation analysis	
New business areas	• Settlement diversification, use of mobile devices • Dealing with globalization • Work style transformation		

To make marketing efficient, it is essential that the behavior and motivation of consumers be understood at an even deeper level than before.

Consequently, in addition to analyzing consumer purchase history and website visiting history, there is also a need to analyze word-of-mouth communication and various consumer contact points such as paths of movement in actual stores. At the same time, means of settlement are extending beyond cash and credit cards to payment by smartphone-based e-money apps, payment by points issued by different companies, etc. In the retail business, systems are needed to support such diverse means of settlement.

2.3 New business areas

1) Creating new business

Uber and Airbnb are typical examples of new business formats born out of changes in the social landscape and in consumer values. For example, the shift of consumer value from possessing things to using services is giving birth to sharing services targeting a wide array of items including bicycles, automobiles, clothes, parking spaces, and conference rooms.

In addition, the target of sharing services can extend not only to things and places but also to production and distribution capabilities and human resources. Different types of industries and companies that have not been connected in the past are now intensifying co-creation activities with the aim of creating such new forms of business. They are also studying methods of using advanced technologies such as IoT and mobile services.

2) Dealing with globalization

As a result of globalization, people, things, and companies throughout the world are becoming interconnected on a scale never seen before. As part of this trend, companies that are making moves into overseas markets need to be able to use a common system throughout the world and receive uniform services and support.

In the past, system development and operations and maintenance were carried out separately at each overseas base. Today, however, the need has grown for effective governance on a global scale to achieve stable operations and maintenance and cost reductions through company-wide optimization. Attention is also being focused on members working in other regions throughout the world, so work style transformation using ICT is promoted.

3. Reorganization of Fujitsu's System Integration Department

Determining how to support its customers' business operations amid a rapid change in market needs has become a major issue for Fujitsu. To deal with today's digitalization and globalization trends effectively, business units in various Fujitsu groups to which system engineers (SEs) belong were reorganized in 2017. Specifically, the Global Services Integration Business unit that SEs belong to was consolidated into three organizations—Enterprise Business Group, Social Infrastructure Group, and Public Service Business Group—and a new group called Digital Front Group was established.

The Enterprise Business Group corresponds to the private-demand sector including the manufacturing industry and the distribution industry as in retail sales and logistics. One objective of the above reorganization and consolidation is to integrate the technologies and human resources that have traditionally been dispersed across individual Fujitsu sites. The idea here is to share the knowledge and experiences that SEs have accumulated up to now in various types of industries and businesses and to optimize product strategy and resources so that Fujitsu can effectively support business areas that could not be supported by past methods. In this way, Fujitsu is working to develop new services for helping customers achieve their own digital transformation and boost our ability in dealing with globalization.

4. Toward customer digital transformation

The role of SEs is changing as the needs of customer systems change. In conventional SoR, the objective was efficient business operations, which meant clarifying system requirements over time and performing high-quality system construction and operation. On the other hand, the objective of SoE is business growth and innovation, which calls for systems that can swiftly and flexibly respond to changing conditions under unclear issues and requirements. Going forward, the role of Fujitsu will be to coordinate these systems, SoR and SoE, having different characteristics.

This section introduces solutions and advanced technologies offered by Fujitsu to help customers achieve their own digital transformations in the manufacturing and distribution industries. It also introduces Fujitsu's activities in new business areas.

4.1 Digital solution for manufacturing industry

1) Digital place for manufacturers "COLMINA"

In May 2017, Fujitsu announced FUJITSU Manufacturing Industry Solution COLMINA as a digital place for connecting monozukuri (manufacturing) sites, companies, and things and giving birth to new services. COLMINA consists of the three components described below.

- COLMINA service

COLMINA service provides a variety of business application groups from design-information management and production/manufacturing management to manufacturing and maintenance support.

- COLMINA platform

COLMINA platform provides service-linking application programming interfaces (APIs) as a platform for connecting information on manufacturing sites, people, and things for all kinds of companies and a database called Data Lake for storing data in diverse formats.

- COLMINA edge

COLMINA edge collects data from facility equipment and sensors and converts that data to optimal data formats for linking to various types of services.

Through COLMINA, Fujitsu plans to roll out a series of solutions including high-dimensional visualization for grasping a company's entire supply chain and maintenance support for sold products. In addition, COLMINA will play the role of a "connecting site" for connecting certified services developed by other companies, thereby, supporting a digital transformation in the manufacturing industry.

2) Solutions using advanced technologies

Fujitsu is developing solutions to support on-site work using advanced technologies. One example is Fujitsu's 3D Superimposed Product Design Diagnostic Solution that uses AR technology to superimpose the photo of a manufactured product on to a 3D design drawing to aid in determining whether the product has been manufactured according to specifications.

This solution can provide workers on the manufacturing floor with appropriate information and instructions at just the right time. That enables even non-veteran, inexperienced workers to work to be done correctly and efficiently. Additionally, to aid in the inspection of facilities, bridges, and other structures, Fujitsu provides a solution that takes pictures by using robots or drones instead of people and uses AI to analyze those images. This solution makes it possible to survey current conditions safely without having to depend on the experience or intuition of human workers and can, therefore, be used to good effect in preventive maintenance and repair planning.

4.2 Digital marketing for distribution industry and services

1) FUJITSU Retail Solution CHANNEL Value

In the field of digital marketing for the retail industry, Fujitsu is providing solutions centered about its FUJITSU Retail Solution CHANNEL Value business platform for applying diverse types of information that can be used in marketing. CHANNEL Value provides integrated customer platforms and marketing information. The platforms collect, manage, and use dispersed customer information. The marketing information uses "behavior DNA" that segments consumer behavior-related data obtained from ID-POS systems, electronic commerce (EC) sites, etc. It also provides a point management service for point cards issued by other companies. In this regard, the diversification of settlement methods is invigorating collaborative businesses that use settlement information and purchasing information such as points between affiliated companies. Within this trend, CHANNEL Value aims to be a platform that can provide new value across different industries and businesses.

2) Solutions using advanced technologies

In the distribution industry, Fujitsu is developing a new logistics solution that uses IoT technology to connect driver and freight information. Targeting the work of dispatching and route design that has traditionally been performed based on human experience, this solution supports integrated decision-making using diverse types of information including past results, weather reports, and traffic information. Fujitsu is also testing and assessing new businesses such as ridesharing

services.

Call centers that handle inquiries from consumers accumulate large volumes of data consisting of past inquiries and responses. Fujitsu is developing a solution that uses AI to learn from those data to enable appropriate responses to be given to inquiries similar to those received in the past. Fujitsu has also begun to offer FUJITSU Business Application CHORDSHIP powered by Zinrai as a solution for enhancing customer engagement by automating the responses themselves to customer inquiries by using an automatic conversation program (chatbot). The use of a chatbot enables 24/7 handling of inquiries, which makes for a higher level of engagement with the consumer.

4.3 New activities supporting new business areas

1) Co-creation with customers

To provide leadership and create new value for its customers, Fujitsu trains in-house "digital innovators" consisting of producers (coordinators), designers (proposers), and developers (technical experts). To drive digital transformation forward, it is important that these three types of specialists having the capabilities listed in **Table 2** create value in an integrated manner.

Digital innovators adopt either a co-creation or technology-driven approach to produce results targeting information systems departments, business departments, or consumers. The co-creation approach aims to create a new service market on the basis of a trustworthy and cooperative relationship with the customer starting from the initial planning stage. The technology-driven approach, meanwhile, aims to achieve the digital transformation sought by the customer by introducing optimal technologies. As experienced professionals, digital innovators seek to create new digital business together with customers.

Table 2
Capabilities of digital innovators.

Type	Capabilities
Producer	• External environment understanding • Organizational skills • Business management
Designer	• Creativity • Planning and building skills • Facilitation
Developer	• Technology surveying • Technology application • Prototyping/enhancing

2) Strategic alliances

Recent years have seen a flourishing of advanced technologies such as AI, IoT, and quantum computing. From here on, we can expect these technologies to become increasingly entwined and to evolve in complex ways. Consequently, in addition to technology development, Fujitsu places importance on creating partnerships with other companies having powerful technologies. To date, Fujitsu has formed business partnerships with many ICT companies including Oracle, SAP, and Salesforce.com and has already begun to provide new services combined with advanced technologies with such partners.

To present its customers with optimal proposals at all times, Fujitsu is striving to make these partnerships even stronger while promoting personnel development and technology exchanges. It is also working to form new partnerships with companies having advanced technologies in the field of industrial IoT (IoT in the manufacturing industry) and to establish collaborations with universities developing quantum-computing technologies.

Fujitsu has also begun to dispatch SEs having knowledge of industries and business to its Silicon Valley base with the aim of finding new solutions. These SEs are conducting exchanges with local universities, various organizations, and startup companies and participating in "pitch events" in which companies come together to make short presentations of their products. In this way, we hope to research and uncover new technologies and new solutions, which can then be matched up with needs in Japan and other regions in the world and proposed to Fujitsu customers as quickly as possible.

5. Conclusion

This paper described Fujitsu's activities to support digital transformation in the manufacturing and distribution industries. It is said that Japanese companies use ICT much like stationary. As a result, there is a tendency when it comes to systems to "place importance on price," "follow existing requirements," and "become vendor dependent." Yet, elsewhere in the world, ICT is being used as a weapon to face the challenges brought on by digital transformation. Planning and design skills as well as personnel competence in advanced

technologies are essential to achieving a digital transformation. With a strong will and sense of responsibility toward accomplishing its own digital transformation, Fujitsu aims to accelerate change within itself with the aim of becoming a good partner to our customers in their digital business ventures.

References

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Yuji Kunii
Fujitsu Ltd.
Mr. Kunii is currently engaged in applications and planning for digital technologies.

Takashi Hasegawa
Fujitsu Ltd.
Mr. Hasegawa is currently engaged in applications and planning for digital technologies.