

ACTIVITIES **1**

Solutions Using Digital Technology to Link Workplace, Management, and Supply Chain

Transcending Barriers between Different Operations and Companies to Optimize Entire Value Chains

Latest Needs of Industry

The needs of our industrial customers have been becoming diverse and sophisticated in recent years. In addition, the spread of COVID-19 has given rise to new issues such as ensuring employee safety and improving productivity through automated, contactless, and remote operations as well as business continuity amid the risk of supply chain disruptions. In addressing these challenges, “boundary” issues are becoming more apparent than ever, where the word “boundary” refers to the gaps between different operations and companies that exist across workplaces, management, and supply chains and that threaten to obstruct improvement.

The Industry Sector of Hitachi supplies total seamless solutions that utilize Lumada to optimize entire value chains and create new business value, resolving these “boundary” issues by using digital technologies to connect the cyber and physical space together (see [Figure 1](#)). This article presents recent examples of such solutions and the associated collaborative creation (co-creation).

Connecting “Boundaries” between Workplace and Management

Warehouse Control System and Racrew, Compact and Low-floor Automated Guided Robots

As electronic commerce (e-commerce) experiences rapid demand growth amid the spread of COVID-19, the

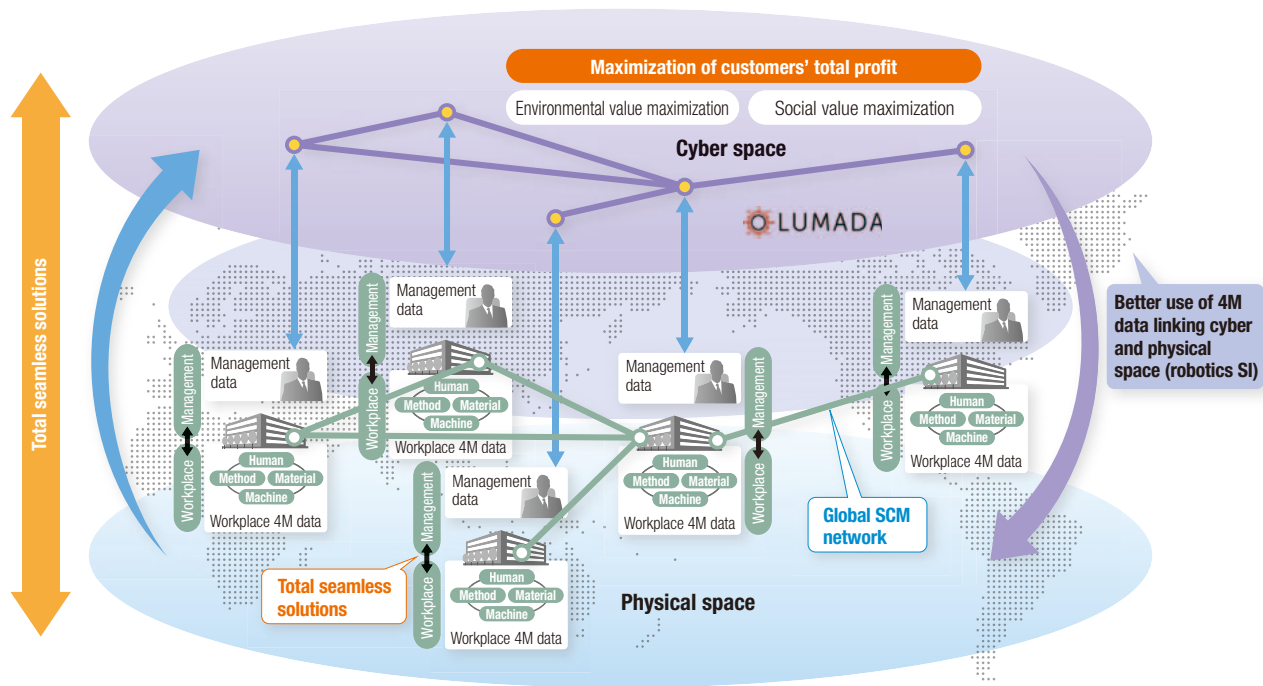
logistics industry is being called on to deliver a wide variety of products quickly and efficiently. Accompanying this, there has been considerable activity around the use of advanced technology for operational automation and labor saving at distribution warehouses and to achieve shorter delivery lead times.

Hitachi has since 2015 been engaged in co-creation in the logistics sector with MonotaRO Co., Ltd., a major e-commerce supplier of maintenance, repair, and operations (MRO) products. This has included the supply of Racrew, compact and low-floor automated guided robots from Hitachi Industrial Products, Ltd. for use in MonotaRO’s distribution centers (see [Figure 2](#)).

Used in production lines and distribution centers where they are able to adapt flexibly to changes in facility layout or stock levels of parts and products, Racrews deliver shelves or pallets loaded with products to designated locations. They help improve materials handling efficiency by using collected data to quickly deliver shelves that are used most frequently and to select routes that minimize congestion.

Hitachi has recently received an order to supply materials handling equipment including about 400 Racrew units as well as a warehouse control system (WCS) that will control all the materials handling equipment for a new distribution center that MonotaRO plans to open at Inagawa in the Kawabe district of Hyogo Prefecture. Provisionally named the Inagawa Distribution Center, it will be the company’s largest. A comparison with the conventional picking practice based on the use of carts estimated that the new system will be more than three times more efficient in terms of throughput. Together with WCS integration, this

Figure 1 | Future Vision of Industry Sector



4M: human, machine, material, and method SI: system integration SCM: supply chain management

Figure 2 | Racrew, Compact Low-floor Automated Guided Robots in Operation at Kasama Distribution Center of MonotaRO Co., Ltd.



will help deliver considerable efficiency and productivity gains, providing an advanced distribution center that can cope with the “new normal.”

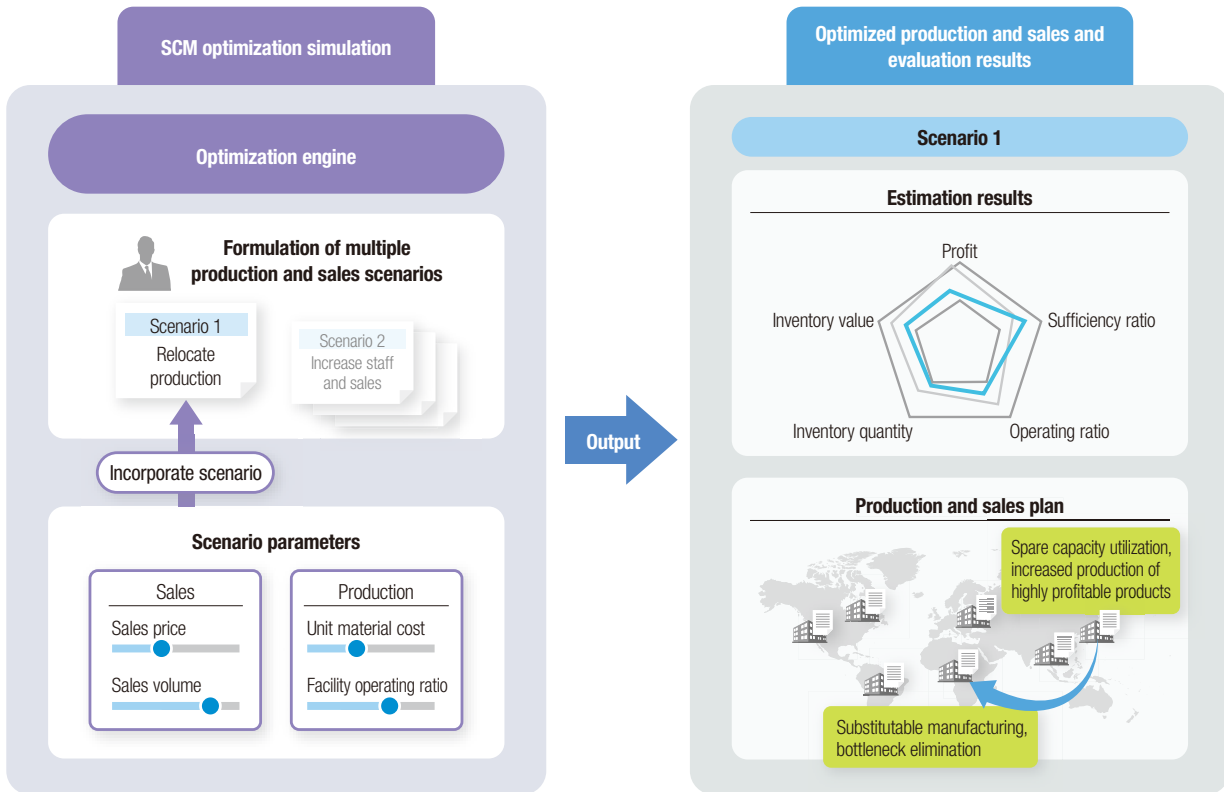
Further system enhancements are planned, including greater use of robotics and a warehouse management system (WMS) that the company is currently looking at installing to enhance functions for issuing optimal work

instructions and the control of employees, equipment, and other resources.

Connecting “Boundaries” between Supply Chains Formulation and Execution Support Solution of Optimal Production and Sales Planning that Quickly Responds to Demand Fluctuations

Along with the dynamic fluctuations in demand that have come with the rising diversity of consumer needs, recent years have also seen a number of emerging issues that pose a challenge for entire supply chains, including over-production or the opportunity costs that result from production delays or parts shortages. Demand is particularly variable for chemicals, an industry that produces a wide range of products. This makes it important to be able to formulate and quickly put into action production plans that can be executed on weekly or daily time scales. It also includes inter-departmental coordination extending from production to sales, with actions being reviewed as the situation changes. Unfortunately, it is very difficult to formulate manufacturing and sales actions and production plans from

Figure 3 | Overview of Formulation and Execution support Solution of Optimal Production and Sales Planning that Quickly Responds to Demand Fluctuations



a management perspective and decide how to go about production and sales at manufacturing and sales operations scattered around the world in a way that maximizes the key performance indicators (KPIs) of profit, sales, and cashflow while also taking into account a wide variety of parameters for each customer and product, including pricing, sales and production volumes, facility operating ratio, production capacity, and tariffs. When done manually, it is a task that demands a lot of time, experience, and expertise.

In response, Hitachi has been engaging in co-creation with Daikin Industries, Ltd. since September 2018 aimed at developing and deploying new solutions for reforming the manufacturing process for Daikin’s fluoro-rubber products.

Drawing on Daikin’s operational planning expertise and requirements, this has involved use of the NEXPERIENCE, Lumada methodology for co-creation to express the company’s different manufacturing arrangements and the trial-ing of a solution that utilizes simulation techniques from Hitachi Solutions, Ltd. for the optimization of supply chain

management (SCM) to support the formulation and execu-tion of operational plans. The result has been the automatic generation of multiple manufacturing and sales actions and production plans that take account of practical con-straints in a way that contributes to KPIs, such as changing procurement, production, and sales channels to maximize profit (see Figure 3).

Through the rapid and automatic generation of approxi-mately 60 times more options for manufacturing and sales actions faster than could be produced when this work was done manually, and by enabling quick decision making based on quantitative simulation of these options, the solu-tion shortens the time taken to make decisions by about 95% (the time from determining demand and the num-ber of available options to the final decision to proceed with production). The solution is now used to manage the global production of several hundred different fluorochemi-cal products, commencing commercial operation in June 2020 at five manufacturing sites and nine sales offices of Daikin located around the world.

Along with expanding the scope of the solution to take in other Daikin products, plans for the future include integrating the solution with plant data collection infrastructure to enable more accurate and timely analysis and management decision making.

Connecting “Boundaries” between Companies Integrated Value Chain Management Platform for Regenerative Medicine Products

Regenerative medicine products^{*1} are recognized for their potential to provide new therapies. Hitachi has developed a platform for the integrated management of cell and tracing information across the entire regenerative medicine value chain, from cell collection, through production and transport, to administration. Having been developed through co-creation with industry partners that include the ethical pharmaceuticals wholesaler Alfresa Corporation, pharmaceutical companies, and medical institutions, the plan is to commence commercial operation in 2021 in the form of a service platform that will be the first in Japan^{*2} to be available for joint use by a wide variety of stakeholders involved in the value chain for these products. Further details about the platform are provided elsewhere in this edition of *Hitachi Review*, in an article entitled “DX Solution for Regenerative Medicine: Helping Usher in a New Era of Personalized Healthcare” (page 61).

Prospects for the Future

This article has presented examples of the co-creation of solutions that combine the experience and expertise in products, operational technology (OT), and IT that Hitachi has built up over many years with use of advanced digital technologies to address “boundary” issues between workplaces, management, and supply chains.

As well as working to supply next-generation solutions that seek to optimize operations from a management perspective, seamlessly tying together entire value chains from

the supply chains that encompass procurement, production, sales, and after-sales servicing to product planning and design, trial evaluation, production design, and design maintenance, Hitachi also aims to be the “best solution partner for industrial customers” through co-creation with these customers and other partners.

*1 Products that have been processed under the responsibility of a corporation among cell processed products used for cell therapy/gene treatment/regenerative medicine.

*2 As of August 31, 2020, based on research by Hitachi, Ltd.