Overview

Business Innovation through Workplace Use of Information
—Intelligent Operations—

Toshiyuki Moritsu, Ph.D.
Keiko Fukumoto
Takeshi Ishizaki
Masaharu Akatsu, Ph.D.
Katsuya Koda

USE OF INFORMATION IN WORKPLACE TO BOOST CORPORATE COMPETITIVENESS

THE need has arisen in recent years for business optimization, new business development, and other measures for companies to improve their competitiveness by utilizing information from a variety of different workplaces, including those for service delivery and for the production, distribution and sales, operation and maintenance, and disposal of products.

This development has prompted a re-evaluation of interactive businesses. Along with ongoing globalization and the spread of the Internet, there has been progress on restructuring to take advantage of lower-cost overseas labor for things like modularized products and standardized services. Given this situation, attention has been directed at sophisticated products and services that deliver higher added value and that are provided through the interplay of knowledge and ideas held by the various different participants in the workplace. One of the challenges of operating an interactive business is to take advantage of the knowledge and other skills of workplace experts. The falling number of production workers, specialization and segmentation of business activity, and a more mobile workforce are making it difficult to pass on the knowledge of highly specialized experts, creating a need for mechanisms that use information technology (IT) to help accomplish this.

Meanwhile, advances in enabling technologies, specifically mobile, social networking service (SNS) and M2M(a) technologies, are making it possible to gain a realtime overview of things like people's activities or the statuses of plants and equipment. There has been growing activity in recent years involving the active use of this data for business improvement or to create new businesses.

WORKPLACE INNOVATION PROCESSES

Achieving the workplace innovations described above requires mechanisms for collecting multifaceted information from the field, utilizing it in decision-making, and providing it as timely feedback to the workplace.

The process for achieving this starts with the centralized collection of data on the people in a workplace (their activities, know-how, etc.), the plant and equipment (operational status, problems, etc.), and the business environment (supply and demand, reputation, etc.) (see Fig. 1). Next, modeling of the data is used to turn it into systematic information. Intelligence (knowledge) is then extracted from the information by analyzing it and using this as the basis for prediction and decision-making. Finally, the knowledge is utilized in operations, either at the workplace or in management.

Hitachi has combined the products and services it supplies to different industries under the banner of Intelligent Operations to help use IT to make this series of processes more efficient.

INTELLIGENT OPERATIONS SYSTEM

This section describes the implementation step of business innovation and the Intelligent Operations system that supports it.

(a) M2M
An abbreviation of "machine to machine." It includes the autonomous collection of data, remote monitoring, and sophisticated remote control achieved through the exchange between machines of sensor and other information via wireless or other communication networks.

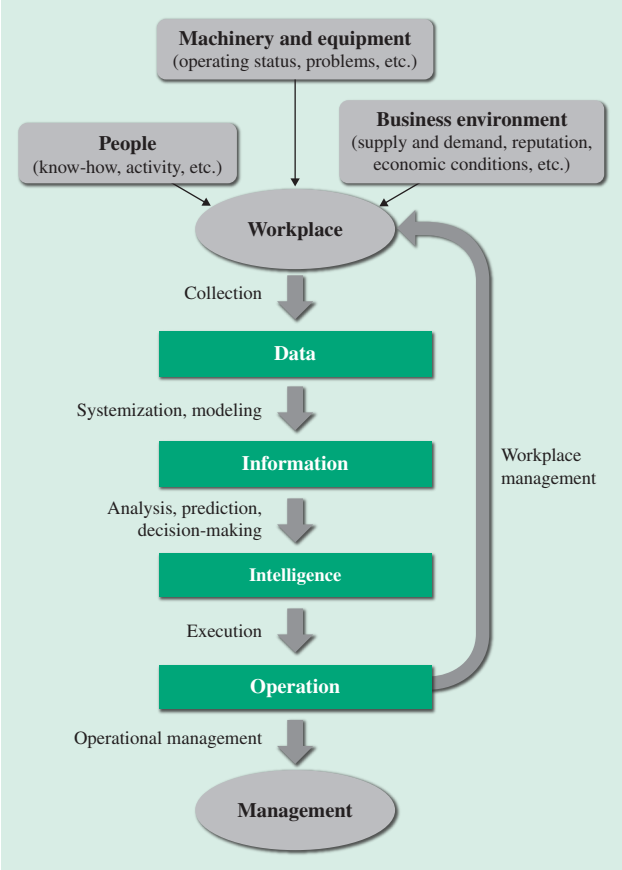

Fig. 1—Data Use Process in the Workplace.
The process extracts knowledge (intelligence) from the various types of workplace data and integrates it into operations.

Since workplace innovation is a new challenge for the companies that attempt it, the benefits often remain unknown at the outset. Accordingly, the implementation step is envisaged as part of commercialization (see Fig. 2).

Step 1 involves undertaking a proof of concept (PoC) to assess the effectiveness and viability of a new service in collaboration with early adopters in the industry.

During this phase, a multifaceted assessment is performed of the profitability and social impact of the service, the ease-of-use of the systems that provide it, and so on. If the results of the assessment indicate that the service is worth implementing, the next step is to move on to the commercialization phase. Since the verification phase needs to identify latent needs and establish the service concept, it consists primarily of consulting. In cases where it is necessary to demonstrate the service using a prototype, this can be achieved using system integration (SI) services.

On proceeding to step 2 (commercialization), the work consists mainly of system implementation, using an SI service to implement the actual system with the business requirements specified in more detail. It also involves undertaking work with the aim of enabling users to improve business efficiency and focus resources on core activities.

Once the effectiveness of the service has become recognized and similar services have started to be set up for other users or different industries, the process proceeds to step 3, which supports the expansion of the service by packaging it and implementing it in the cloud.

Intelligent Operations supplies a suite of solutions that support these three steps. Fig. 3 shows how this is organized.

The Intelligent Operations solutions system is divided into three layers, consisting of the Intelligent Operations Suite IT platform services that provide common platforms, the vertical system implementation and operation services for specific industries, and the consulting services for identifying issues, formulating solutions, and supporting operations.

The vertical services use information on people's activities, equipment operation, and the environment to improve efficiency and service levels in specific

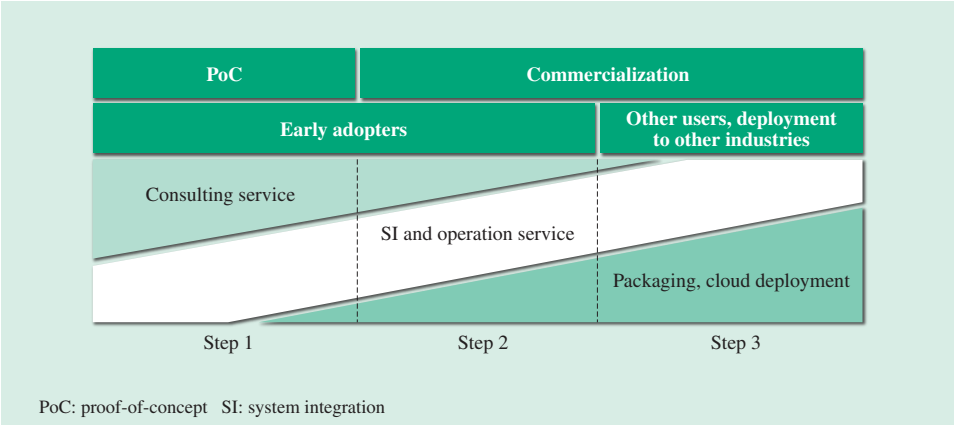

Fig. 2—Implementation Step in Business Innovation and Required Services.
A group of services that cover everything from PoC to commercialization.

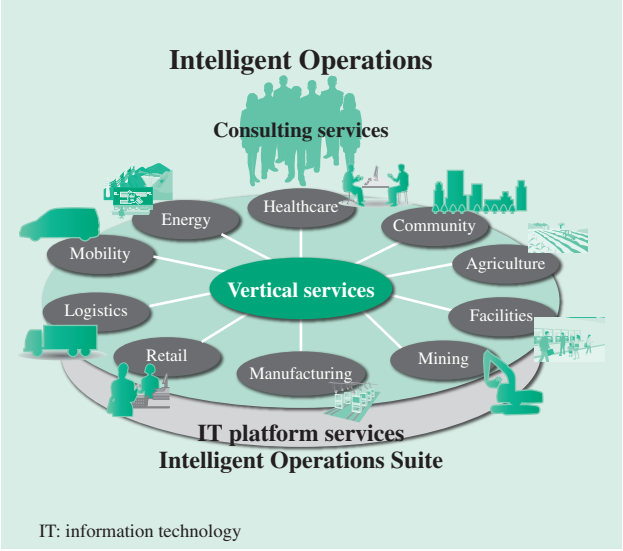

Fig. 3—Intelligent Operations Solutions System.
The Intelligent Operations solutions system is organized into three layers: consulting, vertical, and IT platforms.

industry sectors. Specifically, the services belong to the following 10 categories (see Table 1).
(1) Use of medical information for applications such as insurance and drug development (healthcare)
(2) Local health promotion services for the elderly and others (community)
(3) More reliable production and higher value crops (agriculture)
(4) Safety of social infrastructure equipment, equipment for reducing maintenance costs (facilities)
(5) More efficient operational management and maintenance of equipment (mining)
(6) Support across entire product life cycle (manufacturing)
(7) Support for product development and distribution based on demand prediction (retail)
(8) Support for globalizing supply chains (logistics)
(9) Transportation that is optimized at a city-wide level (mobility)
(10) Use of renewable energy, grid stabilization, and so on (energy)

ACTIVITIES BY HITACHI

Hitachi continues to deliver results by working in collaboration with customers on introducing workplace-focused innovations in a wide range of business sectors, from lifestyle to social infrastructure. The following sections describe a number of leading examples that are covered in this issue of *Hitachi Review*.
(1) Healthcare service in UK

How to moderate the dramatic rise in medical costs associated with the increase in the number of people suffering from chronic health conditions in recent years is a challenge. While diabetes is among the leading causes of death due to chronic illness internationally, it is also known that there are cases where testing can easily identify people before they develop symptoms (while still asymptomatic),

TABLE 1. Summary of Intelligent Operations Vertical Services
These services expedite the provision of solutions in 10 industry sectors.

Vertical service	Summary
Intelligent Operations for Healthcare	Used to deliver services to insurers, drug companies, and others by utilizing the highly secure collection and analysis of data held by healthcare institutions
Intelligent Operations for Community	Delivery of programs that promote the health of the elderly to contribute to providing an aging society with desirable places to live
Intelligent Operations for Agriculture	Stabilizing crop prices and improving distribution efficiency by making agricultural production more reliable and transforming it into a "senary industry" (a term used in Japan to refer to the added-value production and distribution of agricultural goods) against a background of concerns about food shortages or poor harvests caused by population increase and abnormal weather
Intelligent Operations for Facilities	Use of advanced sensing technology and big data to improve safety and cut maintenance and replacement costs for aging social infrastructure facilities
Intelligent Operations for Mining	Productivity improvement through more sophisticated operational management and efficient maintenance of mining equipment
Intelligent Operations for Manufacturing	Total support across the installation, operation, and maintenance of products with direct links between customers, workplaces, production lines, and development centers
Intelligent Operations for Retail	Support for demand prediction, product strategy, and development in response to more diverse product ranges and shorter life cycles
Intelligent Operations for Logistics	IT services that support management strategy and improvements to supply chain efficiency in response to factors such as growing demand in emerging economies and the shift of production facilities overseas
Intelligent Operations for Mobility	City-wide optimization service for trains, cars, and other means of transportation
Intelligent Operations for Energy	Building smart grids that facilitate energy efficiency, the adoption of renewable energy, and the balancing of supply and demand for electric power

and that lifestyle improvements such as diet and exercise can prevent these symptoms from appearing. Through a combination of knowledge and technology acquired from its work with Hitachi's lifestyle change program(b), Hitachi believes that measures such as lifestyle improvement and high-quality advice can be provided to these asymptomatic diabetes patients. This issue includes a case study that describes a PoC project being undertaken in Salford in the Greater Manchester region of the UK (see p. 18).

(2) O&M cloud service for improving efficiency of operation and maintenance of plant and equipment

Along with the globalization taking place in different industries, there is growing demand for operation and maintenance (O&M) services that improve the efficiency of the operation and maintenance of various types of plants and equipment. Hitachi supplies Global e-Service on TWX-21(c), which was developed by adapting the equipment life cycle management system of the Hitachi Construction Machinery group (which has a long experience of operating in the global market) for general use so that it could be used in industries other than construction machinery. An article describes the operational benefits of the service and the technical features that support them (see p. 24).

(3) Cloud-based mining operation management system

The mining business has been shifting away from past management strategies that concentrated on expanding production to focus instead on efficiency based around reducing operating costs and improving productivity. Against this background, Hitachi has conducted a PoC trial of a cloud-based mining industry fleet management system (FMS) to determine its technical viability in terms of parameters such as system performance. It is anticipated that using a cloud-based FMS will eliminate the need to install the system at isolated mine sites and other locations and overcome the challenges of system maintenance and management, which include the recruitment of system technical staff and power supply reliability (see p. 29).

(4) Use of EAM(d) for operation and maintenance of electric power distribution equipment

With the aging of the electric power distribution systems installed or built in North America prior to the 1970s, using efficient maintenance and management to enhance power distribution quality is an important challenge. Power companies in Japan, meanwhile, have built up know-how through their use of advanced maintenance technologies and systems that utilize the collection and analysis of equipment fault data and power distribution systems based on IT. With a view to deploying their operational know-how outside Japan, Japanese power companies and Hitachi are working together on advanced operation and maintenance initiatives for power distribution systems, the EAM system at the core of their services, and machinery operation systems. This issue of *Hitachi Review* contains an article describing this activity (see p. 35).

(5) M2M solution for building energy efficiency and comfort

The M2M market is demanding a shift from vertically integrated systems that are customized for particular industries to horizontally integrated systems that are capable of interconnecting with each other. An article in this issue presents a case study of the energy savings and comfort achieved by the use in an office building of an energy efficiency system that complies with the IEEE 1888 international communication standard for ensuring multi-vendor interconnectivity between the equipment and applications used in building energy management systems (BEMSs) (see p. 41).

(6) Spatial data management for more advanced facilities management

Many city, venue, and retail spaces operate on the basis of predicted or planned parameters. A spatial data management platform supplied by Hitachi can predict what will happen in the future and take appropriate measures by performing control based on

(b) Hitachi's lifestyle change program
A lifestyle change program devised by the Hitachi Health Care Center that aims to achieve weight loss of 5% over 90 days and to maintain it over the next 90 days. It is provided using a cloud-based service for tailored health maintenance advice and lifestyle improvement. It supports weight loss through measures that include setting targets in 100-kcal increments; providing remote consultations via the Internet with health advisors, nutritionists, and others; and sending advice by e-mail.

(c) Global e-Service on TWX-21
A software-as-a-service (SaaS) life cycle support service for machinery intended for Japanese companies with machinery manufacturing and sales operations in the global market. It provides life cycle management of machinery by collecting and storing information on processes such as their manufacture, sale, operation, and maintenance, and by sharing and otherwise using this information. It provides the functions of Global e-Service on Hitachi's TWX-21 business-to-business media service, where Global e-Service consolidates the operational know-how built up by Hitachi Construction Machinery Co., Ltd. (Hitachi's construction machinery subsidiary) through the operation of its service business in the global market. TWX-21 is a trademark of Hitachi, Ltd.

(d) EAM
An abbreviation of "enterprise asset management," a method for companies to manage their equipment assets. EAM achieves improvements by collecting a wide range of operational, fault, materials, and other equipment information, and by performing centralized management throughout the equipment life cycle to maximize asset value and improve the visibility and efficiency of the associated activities.

what is actually taking place in these spaces. An article describes a specific example involving Hitachi's efforts toward visualization and improvement focused on "pulling power," "holding power," and "sale-closing power" at the Hitachi Innovation Forum 2013, a large trade show (see p. 47).

(7) City management platform using big data from people and traffic flows

The next generation of cities will require the optimization and efficient management of social systems, including more sophisticated transportation systems, reductions in carbon dioxide (CO_2) emissions, and the upgrading of aging infrastructure. To achieve this, it is important to determine and record the flow of people and traffic in ever-changing cities and to utilize this information in urban development. Hitachi is developing city management platform solutions that support efficient city operation through the collection and analysis of big data from people and traffic flows obtained using smartphones, smartcards, and various sensors. An article describes example system applications in the form of a smartphone probe demonstration project in Fukuoka and a taxi probe demonstration project in Bali in the Republic of Indonesia (see p. 52).

(8) Hitachi's solution for analyzing distribution data

The retail industry in recent years has experienced an accelerating increase in the quantity and types of information required for analyzing things like customer behavior and which products are the strongest sellers because changes in the purchasing behavior of consumers have been accompanied by other changes such as greater segmentation of customer needs and more diverse sales channels and promotions. Hitachi's solution for analyzing distribution data is a system package that combines a merchandise analysis system, a customer analysis system, and a big data information platform to enable the combined analysis of products and customers, and to present analyses and problem solving processes in story form. An article uses two customer case studies to describe Hitachi's solution for analyzing distribution data and the advantages it provides (see p. 58).

(9) Cloud service for plant factory production

Being heavily influenced by weather conditions, the uncertainties of conventional agriculture (particularly outdoor cultivation) make it difficult to manage. Being underpinned to a large extent by the experience and intuition of producers, it is also a difficult field for younger generations to participate in, with a falling and aging farming population and an increasing number of fields and rice paddies being abandoned and no longer cultivated. In response, Hitachi supplies a cloud service for the integrated management of "plant factories" (closed growing systems). The service transforms the experience of farmers into data to make agricultural management more predictable and to assist new entrants into the industry. The system has been installed at actual plant factories and provides integrated monitoring and control in realtime by using monitor screens at a control center to display information from multiple remote plant factories (see p. 63).

(10) IT platform solution for social innovation

Achieving social innovation calls for the creation of new services that utilize the large amounts of data generated by infrastructure systems. This makes it essential to provide advanced IT platforms that achieve a fusion of resources such as the use of IT for ultra-high-speed big data analytics and operational knowledge derived from experience. An article describes an example IT platform for the mining industry (see p. 69).

INTELLIGENT OPERATIONS FOR BOOSTING SOCIAL INNOVATION BUSINESS

This article has described Hitachi's Intelligent Operations solutions system for achieving innovation in the workplace, and some leading examples of its use in practice.

Achieving innovation in the workplace needs to start with the sharing of information about the practical challenges faced by users, and to undertake the feasibility trials and the phases leading up to commercialization in an efficient manner. In parallel with specific projects involving early adopters, Hitachi is also accelerating its Social Innovation Business by providing the Intelligent Operations suite of solutions required to overcome these challenges.

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ABOUT THE AUTHORS

Toshiyuki Moritsu, Ph.D.
Business Planning Department, Smart Business Strategy Planning, Smart Information Systems Division, Services Division Group, Information & Telecommunication Systems Company, Hitachi, Ltd. He is currently engaged in strategic planning for smarter systems. Dr. Moritsu is a senior member of The Institute of Electrical Engineers of Japan (IEEJ).

Takeshi Ishizaki
Business Planning Department, Smart Business Strategy Planning, Smart Information Systems Division, Services Division Group, Information & Telecommunication Systems Company, Hitachi, Ltd. He is currently engaged in strategy planning for the smart information business. Mr. Ishizaki is a member of the Information Processing Society of Japan (IPSJ).

Katsuya Koda
Services Division Group, Information & Telecommunication Systems Company, Hitachi, Ltd. He is currently engaged in strategy planning for the smart information business, having previously worked on cloud business strategy and studied use of IT in control systems.

Keiko Fukumoto
Business Planning Department, Smart Business Strategy Planning, Smart Information Systems Division, Services Division Group, Information & Telecommunication Systems Company, Hitachi, Ltd. She is currently engaged in strategic planning for smarter systems, having previously worked on semiconductor process development.

Masaharu Akatsu, Ph.D.
Smart Business Strategy Planning, Smart Information Systems Division, Services Division Group, Information & Telecommunication Systems Company, Hitachi, Ltd. He is currently engaged in strategy planning for the smart information business, having held previous positions that include General Manager of the Information Service Research Center at the Yokohama Research Laboratory. Dr. Akatsu is a fellow of the IEEJ and a member of the IPSJ, Society for Serviceology, and The Japan Society for Management Information (JASMIN).