Special Feature How to Develop DX talent to Generate Innovation?

Talk between the CDIO and the CHRO

CDIO Seimei Toonishi CHRO Makoto Sawada

Transforming All Employees into DX talent Increasing On-Site Reform Capabilities for Operational Excellence

Executive Officer
CDIO, President of
New Business Creation Unit
Seimei Toonishi

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Executive Officer
CHRO, President of
Human Capital Group
Makoto Sawada

◆Building a Culture That Encourages Employees to Take Autonomous Action as Citizen Developers for On-Site Reforms

Sawada: Companies need to reform their work systems efficiently and agilely in response to various changes. On the other hand, for the creation of new value, we need to analyze and make effective use of data collected from our customers and bases around the world. Against this backdrop, the Human Capital Group started to work on the development of DX talent on a full scale in FY2021, starting with offering employees basic digital skills training. Subsequently in FY2022, we launched digital literacy-related training to help employees acquire the necessary digital mindset. More than 50% of Hitachi Construction Machinery's employees have already completed this training, which is now also being offered to employees of other Hitachi Construction Machinery Group companies.

Toonishi: It is very important to raise the overall IT literacy of all employees. At the Hitachi Construction Machinery Group, employees belonging to the IT departments used to be tasked with system development. Now, however, due to the progress of technologies, tools that enable system users to develop the systems themselves and low-code and no-code development platforms are available. Accordingly, employees are expected to become capable of reforming their operations on their own, thereby increasing the agility of their workplaces. Also, digital tools are indispensable for the

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Business Units (BUs) to provide customers with solutions in consideration of their respective needs. Further, we need to sophisticate our products. By equipping our products with leading-edge digital technologies to offer solutions truly needed by customers, we will be able to add customer value, which will in turn help increase our market competitiveness.

Sawada: In parallel with implementing measures to raise employees' overall digital literacy, we launched the Digital Challenge Program in collaboration with the DX Promotion Group in 2021, with an eye to developing DX facilitators at our workplaces. We select participants in the program from among applicants from the BUs, and those selected attend basic training and actually experience system development by teaming up with employees with high digital skills. This six-month training program is highly evaluated by participants, and the number of applicants has been increasing each year. Now we are in the third year of the program and implementing it with a focus on team building.

Toonishi: When I launched the DX Promotion Group in 2020, I shared the goal of the Group with its members, which is to achieve operational excellence by acquiring outstanding on-site reform capabilities that our competitors cannot copy. In order to attain this goal, we are working in collaboration with each BU. For successful on-site reforms, it is essential to change the on-site way of thinking and processes, which Mr. Sawada referred to by using the word "mindset." I think that by promoting DX, we can deepen the understanding of our current business processes, identify related challenges, increase our individual ability to meet the challenges, think and take action autonomously, and reform our organizational culture, thereby acquiring on-site reform capabilities.

◆Now It Is Time to Demonstrate the *Kenkijin* Spirit for Both Organizational Culture and Work Style

Sawada: Our administrative departments are already utilizing AI, which is causing the employees to change their behaviors. I can feel the effect of the digital training conducted over the past three to four years, and think it is necessary to make a quantitative evaluation of that effect. As with other educational programs, it is not easy to immediately quantify the effect, but eventually we will be able to measure the effect by using our teams' productivity, efficiency and performance as indicators. Presently, all employees are in the process of gaining basic digital skills, and we need to wait for the full effect of the training to unfold. The Human Capital Group aims to prove that the investments made in human resource development and digitalization are successful in speeding up the improvement cycle. To this end, we have included the improvement of productivity in the human capital key goal indicators (KGIs) that are linked with management indicators.

Toonishi: To this end, team building is indeed quite important. Even when individuals acquire new skills and knowledge, it can be difficult for them to demonstrate the effect individually. However, by working in a team, they can demonstrate it more easily.

Sawada: I think it is important to increase the number of personnel who can achieve results in a team, not limited to achievements in the digital field. Also, if a team has an employee who can generate innovation and create new value, other team members will greatly be inspired by that employee and based on this idea we are implementing human resource development measures for team building as well as for the improvement of individual employees' skills. As part of this effort, we have been encouraging employees to obtain qualification as data scientists and project managers since 2024. We want to increase the number of employees with these qualifications and develop them into team leaders.

Toonishi: After shifting to the phase of actually taking action, the training effect will take hold remarkably. Employees therefore need to participate in a project and take action in it as an important part of their capacity building process.

Sawada: As for the effect measured from the viewpoint of contribution to business performance, the introduction of the DX-CONSULTING sales support app developed jointly with Hitachi Construction Machinery Japan Co., Ltd. has proved to be very effective.

Toonishi: The app enables our salespeople to make an optimal proposal to each customer in a prompt manner, and the average sales recorded by frequent users of this app were 8.5 million yen higher than those of salespersons who seldom use the app. In light of this fact, we will further spread the use of the app among our sales personnel.

Sawada: How was the app developed?

Toonishi: The development process was very reliable. The agile development team, composed of IT engineers from our department and of those in charge of sales and services at the frontline made a pilot version of the app. Then after collecting the opinions of customers about the app, they worked on full-scale development to release it in about three months. In the conventional waterfall-type development, it would have taken more than a year for such an app to be released. Indeed, the project represents a successful example of our team building and agile development efforts.

Sawada: We need to take on a "Challenge," which is one of the three Cs set for our *Kenkijin* Spirit, for both our corporate culture and work style, in response to changes in our business environment. I want all members of the Hitachi Construction Machinery Group, including executives, to embrace challenges proactively and I also think it is necessary to build a corporate culture that encourages employees to embrace challenges even more proactively.

◆Transforming into an Organization with More Agility to Achieve Our Vision Sooner

Toonishi: Our employees tend to think that they have to achieve results. However, in an organization with great agility, both failures and successes are regarded as contributors to overall success.

Sawada: Thinking that you must achieve results in six months or in one year, you might not be able to embrace the challenges boldly, being afraid of failure. If you are allowed to repeat a process of failure and success toward a goal, you will be able to expand the scope and number of things that you can do and you want to do.

Toonishi: Wanting to build a corporate culture that is conducive to greater agility, we set a new budget when launching the DX Promotion Group. Traditionally, IT-related investments are included

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in capital investments, and if you invest 10 million yen in IT, you will be required to recover the investment in two to three years and show its net present value (NPV). In light of this, we set a "strategic investment budget" for the IT-related development projects to be implemented to meet the requirements set in view of the needs and problems faced by individual customers, and an "IT research budget" for research activities to be conducted by making effective use of the latest digital technologies. The aforementioned sales support app was developed by using these budgets.

Sawada: It is necessary to flexibly assign personnel, depending upon what challenges the company will allocate investment money to.

Toonishi: Yes, exactly. Our biggest DX target is to make effective use of the data accumulated by Hitachi Construction Machinery over 55 years since its founding. By utilizing the voluminous data that are unique to us and are therefore invaluable, we can leverage our past investments for the future management of the Hitachi Construction Machinery Group. For the analysis of data from different periods and systems, we need both data scientists and data concierges. By acquiring these specialists and forming a "DX *Kenkijin*" team that is well versed in our products, solutions and customers as well as in DX, we will be able to achieve this ambitious target.

Sawada: We have been attributing more importance every year to the employment of highly in demand students who have expertise in data analysis. We have also been participating in a consortium of companies established to send Japanese data scientists to gain experience on the global stage. In FY2024, we invited students from Shiga University to work with us as interns and launched a project with the participation of these students. Also, at the workplaces led by Mr. Toonishi, personnel who are expected to lead our future reforms are being developed.

Toonishi: We have multiple employees who won prizes or were ranked high at external hackathons[*1] and competitions. For example, we have an employee who won the first prize at the fintech competition held on the utilization of financial data[*2].

Sawada: That's amazing. We need to build a system to highly evaluate employees who take actions outside the company like these employees and inspire others as "influencers." The Human Capital Group's most important role is to invest in people, and we will implement a strategy linked with the company's strategy to become a true solutions provider, thereby supporting the entire Hitachi Construction Machinery Group in enhancing its business management.

Toonishi: We started to introduce a generative AI system to our company last year, and now about 900 employees are utilizing it. I expect that employees will be able to increase their operational quality and productivity by learning how to efficiently utilize the system at the workshop held by the company for this purpose. For the skilled use of AI by employees, it is also necessary to give them education on prompt engineering. "Prompt" means an instruction or an order, and an AI system might give an unexpected response to you if you fail to give an appropriate prompt to it. Prompt engineering skills are

indispensable for employees to expand the usage of AI, and I would like to enhance the educational content on these skills in collaboration with the Human Capital Group. Also, in order to change the current business processes and models, we need to have people who are strongly committed to changing them. I often say, "Let's create a narrative" when giving instructions to employees. A "narrative" is a persuasive story and more than just a simple story. By creating lots of narratives, we can visualize what we aim for. By changing individual employees' behaviors to transform our organization into one with more agility, we can offer useful solutions more promptly to customers, which will in turn help us achieve the vision of the Hitachi Construction Machinery Group. I strongly believe that we can become such a company.

*1 Hackathon: An event in which developers compete on a specified theme within the given period

*2 Raito Shimizu (Data Utilization Sec., DX Promotion Group), who is featured in "Roundtable Meeting of Employees" starting on page 31 of this report.

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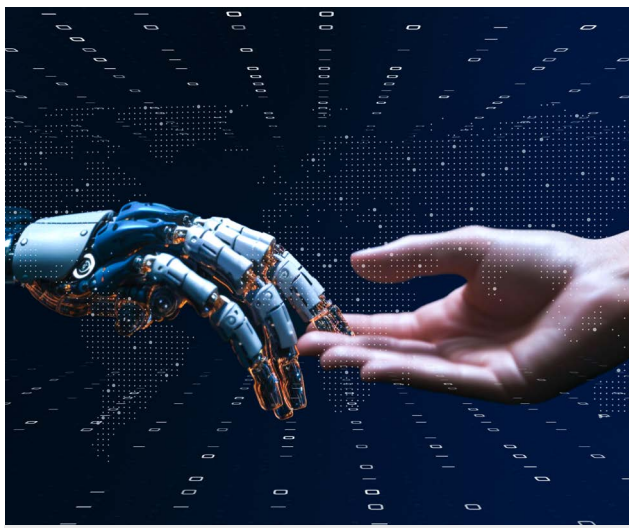
Examples of the Effective Use of AI by the Hitachi Construction Machinery Group



The Hitachi Construction Machinery Group is working toward DX by making effective use of AI and based on its customer interest first (CIF) approach. For each BU and department to make more effective use of data, we have built a data utilization platform (DUP) and have been implementing it by consolidating the data of the Group's core systems. The DX Promotion Group's Data Utilization Sec. is implementing measures to help each in-house department solve their operational issues by making effective use of data and AI, aiming for speedily adding value that can be offered to customers through the effective use of big data.

Example 1 Predicting the Parts Manufacturing Costs to Be Incurred at Overseas Production Bases

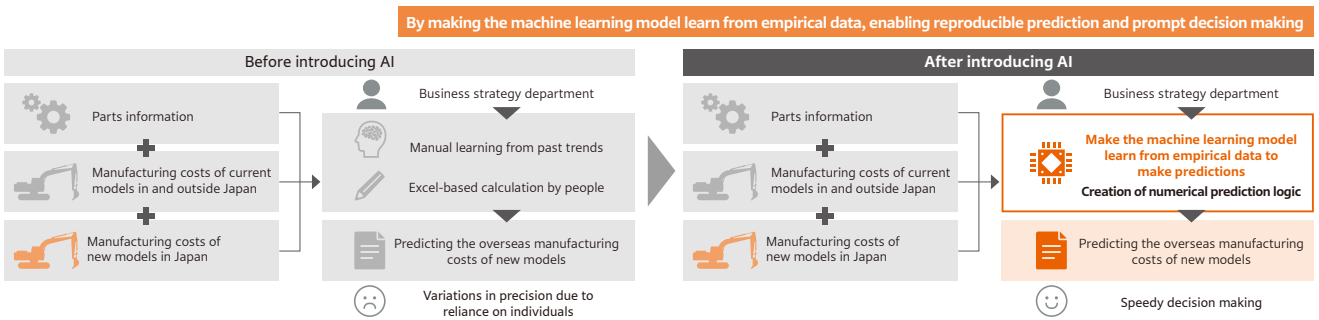
Value that can be created: Cost control and greater profitability through optimized production allocation

In order to increase our corporate value, it is essential to make maximum use of the production capacity of our global production bases and establish a highly efficient and cost-saving production system. The costs of producing our machines (including the parts manufacturing and assembly costs) differ by region, and it is necessary to estimate the local costs when selecting or changing the manufacturing base for a product. The Construction BU's Business Strategy Dept. estimates (predicts) the local parts manufacturing costs in the examination carried out to determine where to manufacture a product. However, one hydraulic excavator is composed of several hundred parts, and it is not easy to accurately calculate the cost of manufacturing these parts incurred at our overseas manufacturing bases. Accordingly, we tended to rely on certain personnel for the calculation. In order to solve this issue, the Data Utilization Sec. launched a project to shorten the lead time required for the estimation of costs and to standardize the procedures for it.

Employees in charge have a vast amount of data and expertise for the estimation, including detailed parts information (their weights, prices and so on), the costs of the parts used in our current models incurred in Japan, and the costs of making the same models outside the country (cost differences). We decided to make AI learn from the data possessed by these people to estimate the costs, thinking that numerical prediction based on structured data is a field suitable for machine learning and that generating a prediction model by using the information about our current models will enable us to estimate the cost of manufacturing the same product at a different base or the cost of manufacturing a new model.

As a result of conducting verification work, the AI model's prediction error was confirmed to be ±1 to 10%, and the lead time was reduced from several weeks to several minutes. We spent about two months on the project and could thus realize results within a short period of time through supervised learning, which is a type of machine learning conducted by using data labelled with correct answers.

Estimating (Predicting) the Manufacturing Costs Incurred at Overseas Production Bases



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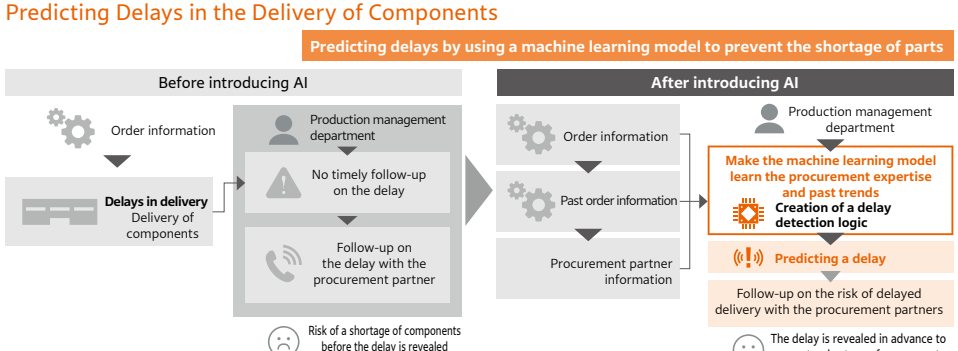
Example 2 Predicting Delays in the Delivery of Components

Value that can be created: Stable supply of components, improved supply chain management

The Component Production Management Dept. of the Production Management Div. places orders for components required for manufacturing at the overseas production bases to procurement partners and then delivers the procured components to the bases. We need to manufacture a range of construction machines in small lots to meet the individual needs of customers. Against this backdrop, some of the components to be supplied to the bases were not delivered as planned, without such delays being predicted in plenty of time for the personnel in charge to detect related risks and implement follow-up measures, resulting in exerting influence over production at the bases and posing a serious problem to them. In order to solve this issue, the Data Utilization Sec. launched a project to predict delays in the delivery of components.

In the first phase of the project, the Sec. set the following delivery delay-related parameters: types of components (complexity, size, etc.), numbers of items ordered and the production capacity of the procurement partners, then made a machine learning model learn the causal relationships, and verified the precision of the established model. As a result of the verification work, the correct prediction rate was revealed to be 50%. In order to increase the precision of the prediction model, which is still below the expected level, we will continue to conduct the verification work. Also, we will foster discussion and carry out more tests to raise individual employees' awareness of the importance of operational reforms through this initiative and to eliminate delivery delays by making use of AI-based predictions in our conventional operational processes.

Predicting Delays in the Delivery of Components



Example 3 Automating the Monitoring of the Operational Status of Mining Machinery

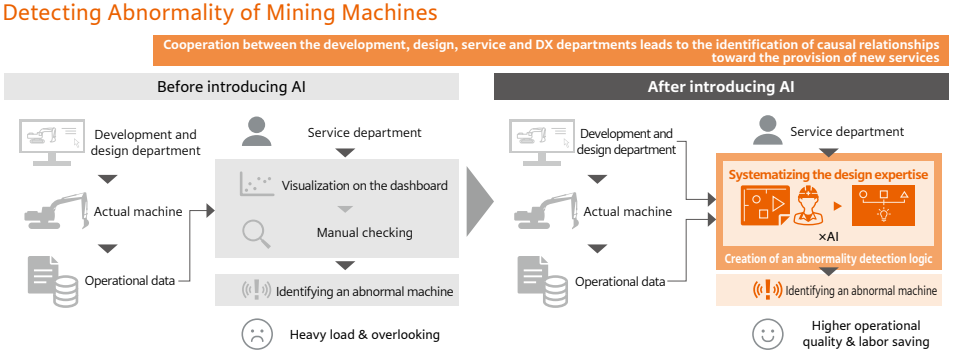
Value that can be created: Addition of customer value through the preventive detection of machine failures

The Mining BU's Data Business Promotion Dept. is monitoring the operational data of machines sent to it online, and when a sign of abnormality is detected, the Dept. works to prevent the machine failure in cooperation with the local dealer. However, there are more than 3,000 mining machines in operation across the world, and it is impossible to monitor the operation of all of them manually 24 hours a day and 365 days a year. Also, the status monitoring work requires deep expertise about the machine operation environment, including their specifications and how they are being used, and the number of employees who can fulfill this demanding monitoring role is quite limited.

In order to deal with this issue, the Data Utilization Sec. worked to select the parts targeted for abnormality detection and to identify the information necessary for the detection, and then made a machine learning model learn from the past results, thereby making it possible to predict normal values for machines in operation. When the predicted values are compared with the actual operational data and the gap is large, the abnormality detection logic will deem the status of the machine abnormal. In the normal value prediction phase, we limit the number of data used to visualize the causal relationships for machine failures by using our design expertise and adopt only relevant parameters for higher precision.

Unlike Examples 1 and 2, abnormality does not necessarily result in machine suspension, and so for the machine learning, we adopted unsupervised learning without correct answers for the project, which requires more time for evaluation and the continuation of relevant measures.

Detecting Abnormality of Mining Machines



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Roundtable Meeting of Employees

* The affiliations and titles are as of the time of the roundtable meeting.

Kazuhiro Nishimoto
Engineer, Business Strategy Dept.
Business Planning Div.
Construction Business Unit

Yutaka Inumaru
Assistant Manager, Customer Experience Sec.
Data Business Promotion Dept.
Digital Solution Promotion Div.
Mining Business Unit

Raito Shimizu
Assistant Manager, Data Utilization Sec.
DX Technical Strategy Dept., DX Technology Div.
DX Promotion Group

Oriha Ishikawa
Component Supply Sec., Component Production Management Dept.
Production Management Div.
Production & Procurement Group

Increasing the Future Value of the Hitachi Construction Machinery Group through On-Site/Business Innovation Fostered Autonomously by Employees

◆ **Making AI Learn from the Excellent Knowledge Possessed by Employees, Thereby Eliminating Dependence on Specific Personnel**

Shimizu: In 2021, the DX Promotion Group officially launched the Data Utilization Sec., which is composed of personnel who have expertise in data and who can create value from the effective use of data, including data scientists and data concierges. I am a member of this section, which is committed to making effective use of data to solve all kinds of problems faced by the company and increase its productivity with agility. However, the problems to be dealt with by the section are those faced by each of the Business Units (BUs), so we need to raise the awareness of the BUs about our section and provide them with an opportunity to create something with us to experience the value gained through data utilization. To this end, we asked the BUs to let us share their operational problems on the internal portal website.

For about three years since then, we have been able to conduct

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activities with the BUs and various other departments to solve a range of issues faced by them, including individuals' need to improve their operations and issues that have a direct impact on departmental sales. To this roundtable meeting, I invited some of the people with whom we have worked to make more effective use of AI and data, wanting them to talk about the experience that we had together.

Nishimoto: I contacted Mr. Shimizu on the very day on which I had received an email asking me to share any issues with him. At the time I was faced with a problem regarding the estimation of the parts manufacturing costs to be incurred at our overseas production bases. Our total production capacity of medium-sized hydraulic excavators is more than 30,000 units per year, and we can increase the actual production quantity by making more effective use of this capacity. Before switching production from one base to another to this end, it is necessary to estimate the parts manufacturing cost incurred at that base, which is my job. For an official estimation of the cost, I show the related drawings to the procurement partners located near the base and ask them to submit quotations, however, this entails an information leakage risk and takes a considerable time. Also, some partners do not respond to my request for estimation or submit inaccurate quotations. Therefore, I sometimes estimate the cost based on past data myself.

I estimate the parts manufacturing costs by using Microsoft Excel, checking the list of parts, which comprises of several thousands of lines and indicates relevant costs. Indeed, this task depends heavily on specific individuals, as it is quite difficult to produce the same estimation results consistently. I have taught several people how to estimate the costs, but the estimation requires making some intuitive guesses, which is difficult to teach how to do. Also, the estimation results greatly differ by person and discourages us from standardizing the estimation procedures. When I asked Mr. Shimizu to create an AI model for the estimation, I hoped the model would (1) make correct calculations and (2) find errors in manual calculation.

Shimizu: In response, I started to work with Mr. Nishimoto to find out a method to estimate the overseas manufacturing costs based on the manufacturing costs incurred in Japan for our current models, for which we utilized the operational process data possessed by Mr. Nishimoto. We had good results in the prior verification work conducted in FY2024, so in FY2025 we entered the phase of making an AI model actually estimate the domestic and overseas manufacturing costs for our new machine models, thereby checking the AI's capability. The essential part of a DX activity is to input the knowledge stored in human brains into a system, for which the knowledge owners need to communicate what they are thinking and doing to the system, and for which I need to derive enough information from the owners. Mr. Nishimoto gave me all the necessary information. Also, the data possessed by him were well organized, and so we were able to push ahead with the initiative very smoothly.

◆ Creation of an AI-Based Machine Status Monitoring System by a Data Scientist Versed in Machine Design

Shimizu: I am a data scientist who knows a lot about the operation of the company. A company that has no such data scientists usually builds an AI system jointly with an AI vendor, who is a skilled specialist in AI. However, the vendor would have little knowledge about the company's business, products and operations, and it would take a considerable time for the vendor to collect the necessary information. Mr. Inumaru, you have recognized this fact strongly recently, haven't you?

Inumaru: Yes, indeed. I have been engaging in a machine status monitoring automation project since 2023. In the past, there was a case in which the alarm rang on the pantograph-related electrical system of a trolley dump truck at a construction site of a customer, and an electrical mechanic of our company rushed to the site for troubleshooting. However, the problem was not solved, and a machine mechanic belonging to a different department of the company took over the work and finally found out that the alarm went off due to the malfunction of a hydraulic component. Hearing about the case, I thought that we might be able to minimize unnecessary on-site work and the inconvenience caused to customers if we could detect a machine failure by a data-driven method based on our overall expertise in machines. This encouraged me to launch the project.

Initially we asked an external AI vendor to develop an AI-based machine monitoring system. However, it took a long time for the AI to learn about our construction machines. Specifically, to build the foundation of the AI-based monitoring system, three to four employees who belonged to the Product Support Dept. at the time, including myself, worked two to three hours a week to review some 100 cases in which the AI detected an abnormality based on data. As it thus took many hours for us to do the review, we were unable to proceed to the process of making the AI actually detect the signs of machine failures. But subsequently, about a year ago, Mr. Shimizu, who had become a data scientist after working as a mining machine designer, joined us to help us foster the project. Based on the structures of the machines, he included domain knowledge, such as data relationships, into the elements of machine learning, and then the AI system began to list up only truly related values. Now we are fine-tuning the system to increase its precision.

Shimizu: We cannot determine whether or not the machine for which the alarm rang truly has an abnormality that causes the machine to fail, and this fact makes the detection of the signs of failures difficult. In other words, at the time when the alarm rings, we have no

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correct answers about whether or not the machine will truly break down. We therefore have decided to choose specialists in each machine component from among our designers and ask them to examine the data about the abnormalities detected by the AI system and to check whether or not the detected abnormalities are true abnormalities. Also in this initiative, it is indeed essential to make the AI learn from the advanced knowledge possessed by people.

◆ Predicting Delays in the Delivery of Components, Which Poses the Greatest Problem to Staff Engaging in Production Management

Ishikawa: I asked Mr. Shimizu to help us predict delays in the delivery of components purchased from procurement partners for use at our overseas manufacturing bases. It is truly difficult for us to predict such delays. We want to obtain information about delivery delays as early as possible so that we can change the transportation means or ask the overseas manufacturing bases to adjust their production plans to deal with the delays. It is quite difficult for the bases to adjust the plans when the delay is revealed only on the planned delivery date. In the worst case, the manufacturing bases will have to suspend their production lines due to the delay. I hear that experienced procurement staff who are daily communicating with procurement partners can grasp the sign of a delay to some extent, but this is tacit knowledge only possessed by these specialist staff.

Shimizu: I interviewed experts in the field, and they listed the features of the components, numbers of items ordered, and the production capacity of the procurement partners as parameters related to delivery delays. It is difficult to grasp the production capacity of procurement partners. At any rate, we set a parameter for the production capacity of individual partners by using available data and then made a machine learning model learn the causal relationships. The model's correct prediction rate is now 50% and is still too low to be useful for Ms. Ishikawa and other members to check for delays.

Ishikawa: We want to collect quantitative data, but there are a range of reasons for delivery delays, including the weather, the delivery amount, too short deadlines, the complexity of component structures, and how busy our procurement partners are.

Nishimoto: Indeed, it is difficult to measure how busy a procurement partner is. When I was working at the Production Engineering Dept., I was unable to even accurately grasp the volume of orders placed by other members of the Dept. to individual procurement partners. Therefore, it is impossible to check the volume of orders placed by our competitors to the procurement partners.

Ishikawa: Presently, we are working to increase the model's correct prediction rate by adding more data and trying a range of machine learning methods. We have found that as the production quantity increases, the prediction precision also rises, and as the production quantity decreases, the prediction precision also drops, and based on this finding we are trying various methods.

◆ Realizing DX under the Slogan, "For the Benefit of All"

Shimizu: In order to increase the number of people who proactively gain knowledge in DX like you three, I think it is best for the company to build a system to fairly evaluate such behaviors. The company already has a monetary incentive system to encourage employees to obtain qualifications, but I think a system to link the achievements made by employees with the amount of their salaries is also necessary. For employees, a salary rise is the best kind of reward, and such an incentive system will also help attract excellent human resources to the company.

Nishimoto: I am often asked to work for other departments, and I like working for them, feeling pleased to be able to support someone. I started the cost estimation initiative to perform my own job more easily, but now I want to make the AI model available to all. In the past, the company depended heavily on individuals for specific knowledge as a matter of course, and I used to beg senior staff members to advise me every time when I needed their knowledge. I hope that we will be able to build a system that will help everyone estimate the costs easily without the need to beg for help.

Inumaru: Younger employees who have advanced digital skills can utilize digital tools quite easily and may finish a task for which I need half a day in several minutes. I cannot think as flexibly as Mr. Nishimoto, what I can do is suggest how to make improvements to what the young staff have created.

Shimizu: Mr. Inumaru, you have extensive work experience and so you can easily assess the created tools. When I joined the company, it was necessary to write code from scratch to develop a system that I strived to design. At the time I did not imagine that a day would come when tacit knowledge could be transformed into tangible data in several minutes by AI and machine learning.

Ishikawa: Delivery delays pose a serious problem to the Hitachi Construction Machinery Group. If a delay causes a shortage of a component, we have to visit the manufacturing facilities of the relevant procurement partner and stay there until we can get what we need. The delays are thus imposing a significant burden on employees. If an AI model can predict such delays with precision, we will be able to reduce the time spent on recovery and devote ourselves to doing more important tasks while improving our work-life balance. Also, by accumulating knowledge and information about the causes of delays, we will be able to take more actions to prevent such delays. I would therefore like to complete the project for the Group and members of our overseas manufacturing bases.

Inumaru: DX is a key to implementing the slogan, "For the benefit of all." If the benefit were given only to myself, I would not devote so much time and labor to make effective use of digital technologies.

Shimizu: I completely agree with you. It will make us very happy if our commitment to benefiting all eventually helps increase the corporate value of our company.