Innovation driven by Social Needs with Technology and Human Resources
The Challenge of Evolving Technology Management

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Director, Senior Managing Executive Officer, CTO and Senior General Manager, Technology & Intellectual Property HQ and Senior General Manager, Innovation Exploring Initiative HQ

Kiichiro Miyata

OMRON is implementing management based on the OMRON Principles to create Social Needs for solving social issues. Management based on the OMRON Principles is supported by Technology Management. OMRON has leveraged the power of technology to create a series of the world-first products and systems such as non-contact switches and automatic ticket gates. With the ever-increasing pace of technological innovations such as AI, IoT, and robotics, how does OMRON envision the future and what social issues will the company solve? We asked CTO Miyata, who has been given the job of accelerating OMRON innovation, about evolving technology management.

(Interviewer: Editorial Department)

Creating a Template for OMRON-style Innovation

—— Editorial Department (following in bold): Regarding OMRON-style innovation, How do you define it and how are you trying to accelate?

Miyata (omitted below) : OMRON-style innovation relies on technology innovation to perform near-future design tailored to solving social issues. This is what OMRON's technology management is all about.

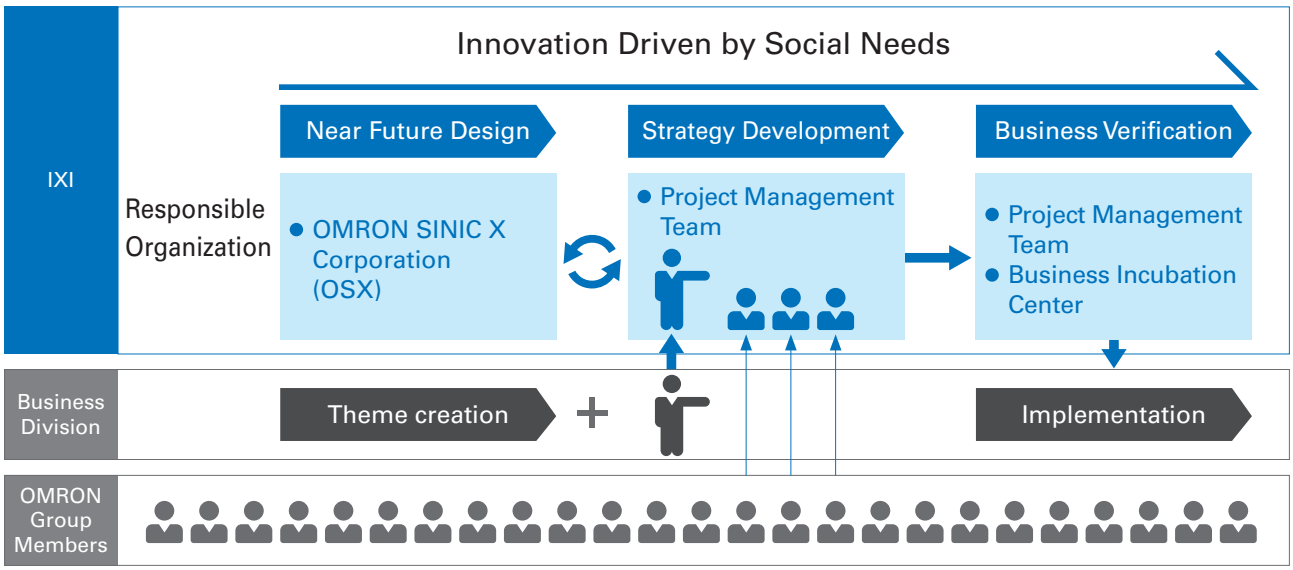
Since coming on as CTO, I have worked to pick up the pace with which OMRON as an organization innovates by establishing and strengthening technology management to enhance our ability to create solutions to social needs. By developing and implementing a company-wide technology strategy we have sharpened our Sensing & Control + Think core technologies. Especially since the start of VG2.0 in 2017, we have created a template for OMRON-style innovation that meets the needs of the era to improve our technology management and speed up the creation of innovative technologies. Specifically, we have set up a professional organization to create backcasting innovation that begins from the standpoint of near-future design and extends to developing strategies and business validation. We accumulate knowledge generated by this organization in-house.

——This organization consists of the Innovation Exploring Initiative HQ (IXI), which started full-scale operations in April 2018, and its subsidiary OMRON SINIC X Corporation (OSX). It's been a year since this organization started up. What's been the response so far?

IXI is an organization that has all the capabilities necessary to do backcasting innovation, and can go through the entire process in a single operation. The role of the OSX subsidiary is to do the near-future research that is the starting point for the process of creating innovation. OSX has brought in many top talents from outside in the fields of AI, IoT, robotics, and other leadingedge technologies. This company makes the best use of talented staff, while working with research groups inside and outside OMRON, engaging in open innovation and performing near-future design.

When IXI was set up, the focus was on making it an innovation platform for OMRON. OMRON has tried, but failed, several times in the past to establish a department that creates new businesses. When we looked back on why these attempts failed, we found the answer. That was because it was a "remote island." In addition to being highly independent, there was a "show us what you've got" attitude from the standpoint of

Innovation Exploring Initiative HQ (IXI) as Group-Wide Innovation Platform



our existing business units, and the business units were not able to provide compelling ideas or leadership. The challenge was how to change this situation.
To achieve this change, we have actively promoted IXI since its establishment both inside and outside of OMRON. As a result, IXI has brought in over 60 ideas over the past year from inside and outside of the company, and nearly 20 projects have been launched that promise to have a real impact. In addition, over 20 young strategic candidates from across the company have participated in IXI.
One of the projects launched by IXI is the *Cooperation agreement to solve problems in Japan's regional cities with a view toward 2030* which was announced jointly in April 2019 by the city of Maizuru in Kyoto Prefecture and OMRON's Social Systems, Solutions and Service Business. The impetus for this project came about when Mr.Yamaguchi who is deputy mayor of Maizuru became aware of the existence of OSX and indicated that he wanted to work with OMRON on regional development in Japan. The decision was made by IXI to start up the project immediately after discussions between the deputy mayor of Maizuru and the CEO of OSX, and a project team consisting of people from the city of Maizuru, IXI, and SSB was formed. The project team held discussions about what framework needs to be built to revitalize regional cities with populations between 50,000 and 100,000 people, what these cities should look like in 2030, and what sorts of technologies and business models are needed to achieve these goals. The project is currently at the stage where demonstration tests are being conducted toward the implementation of the near-future designs that have been created. This is an example of IXI's innovation creation process, one which develops near-future in response to social issues, formulates strategies and business validation, and demonstrates the dependability of the system that makes this all possible.
There are a number of projects like this that are now under way. Management needs to be patient because it takes time to achieve great results. There really is a great deal of potential here. I'm really looking forward to seeing what develops.

P53 Social Systems, Solutions and Service Business (SSB) →

——This means that the "template" for OMRON-style innovation is starting to work. On the other hand, the technology to create innovation is essential. What has been the response to the strengthening of core technologies?

It takes people to create and refine technologies. In the process of implementing our company-wide technology strategy, we have been paying particular attention to hiring and training technical people. One result of this is that we have been raising the number of technical presentations and the quality and quantity of our patent holdings. In FY2018, we increased both the number of technical presentations and number of patents held by a substantial factor of 1.4 over FY2014. In terms of the quality of our technology as well, the number of OMRON technical papers selected by leading scientific meetings has increased, while we have nearly doubled the ratio of patents offering promise of making significant contributions to our business. These are solid results. This shows how far we've raised the bar on our ability to implement into technologies into society from across OMRON.
We are also seeing the creation of near future technologies and concepts such as technology that integrates the learning models of artificial intelligence (AI) using distributed data, platforms that remotely control robots, and the image inspection technology that can replicate human senses and other unique near future technologies.

As We Advance into the Future, We will Move to Still-higher Levels of Innovation.

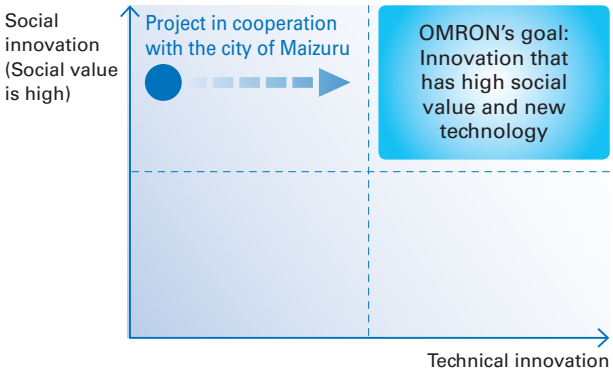
—— I can see how you've managed to improve both the *template* and the *technology*. What are some of the tasks that lie ahead for OMRON?

As we have improved our skills in technology management, new issues have emerged as we further accelerate our response to Innovation driven by social needs. That is, how do we create innovation with high social value that is accompanied by technological innovation. As we see in the case of the city of Maizuru, we have set up a process for creating innovation with high value to society that involves designing for the near

future with social issues as the starting point, and then implementing these designs in society. We are also training people who can engage in that process. However, for OMRON to continue as a venture that on its own creates an autonomous society, we need to create innovation that has high social value and technical innovation that can solve future social issues that no one can anticipate. In the project with the city of Maizuru, we are demonstrating social value and are studying ways to further enhance innovation through technology. To that end, in FY 2019, we will closely focus on creating new value to increase social value and on strengthening competitiveness with advanced technology to bring about technological innovation. Specifically, we will focus on strengthening human resources, structure, and on knowledge management.

It is urgent in particular that we train architect human resources that can build the technology and intellectual property strategies and business models that will be essential to run the innovation creation process at IXI. We also need people at the Technology & Intellectual Property Headquarters who can leverage AI, robotics, and other core technologies to fuel the process of technical innovation. These types of people are hard to find in the employment marketplace, so we have to train them and increase their numbers ourselves. That's why IXI has created a new internal strategic human resources development organization. In FY 2018, we identified conceptual ability, communications ability, and the ability to carry tasks to completion as the three elements required of architect human resources. These are the abilities needed in the areas of technology strategy, intellectual property strategy, and creating business models. We also assessed the degree to which each of these abilities are needed. To expand our capabilities in these areas, we will be training strategic human resources candidates who are participating from throughout the company by having them engage in a variety of experiences in the innovation creation process that has been developed by IXI. Core technology human resources start from the definitions of capability requirements, making reference to IXI's human resource development process. Meanwhile, the Technology & Intellectual Property Headquarters is continuing the training of human resources through the implementation of policies that facilitate the search for new technologies.

Advancing into the Future and Moving to Still-higher Levels of Innovation.



We're also creating opportunities for people to gain experience in testing out intuitive ideas and giving shape to these ideas through systems designed to enhance both social and technical value. We are creating opportunities for team members to refine their ideas through the process of discussion and debate with people who have a different outlooks and a diversity of knowledge.

The expertise gained from success stories at IXI through the experience of running their processes along with the value creation expertise of the Technology & Intellectual Property Headquarters will be accumulated as organizational knowledge to ensure reproducibility and continuity. This organizational knowledge will be transformed into assets that can be deployed throughout OMRON.

OMRON's technology management has frameworks such as stances, strategies, processes, organizations, and systems as well as the human resources to put these in to action. Going forward, we will develop knowledge management, which is an all-out battle to bring together company-wide knowledge that are organically linked to frameworks and human resources to maximize results. We will also create the conditions in which we generate a series of responses to social needs in every OMRON organization.

You can expect more innovation driven by social needs from OMRON.

Industrial Automation Business (IAB)

Domain: Factory Automation

Corresponding SDGs

Vision

Bring Innovation to Manufacturing by Automation, to Enrich Lives of People All Over the World.

The Industrial Automation Business leverages OMRON technologies to create innovations in manufacturing. These innovations contribute to productivity advancements in the world's manufacturing industry. The pace of automation on production floors is increasing. Today, the automation of production floor are growing rapidly. Setting our unique innovative-Automation concept, our aim is to enrich the lives of people around the world by generating/making manufacturing innovations through our technologies and solutions based on the widest range of control devices in the industrial market.

Executive Vice President
Company President, Industrial Automation Company

Yutaka Miyanaga

Common Issues on Production Floors

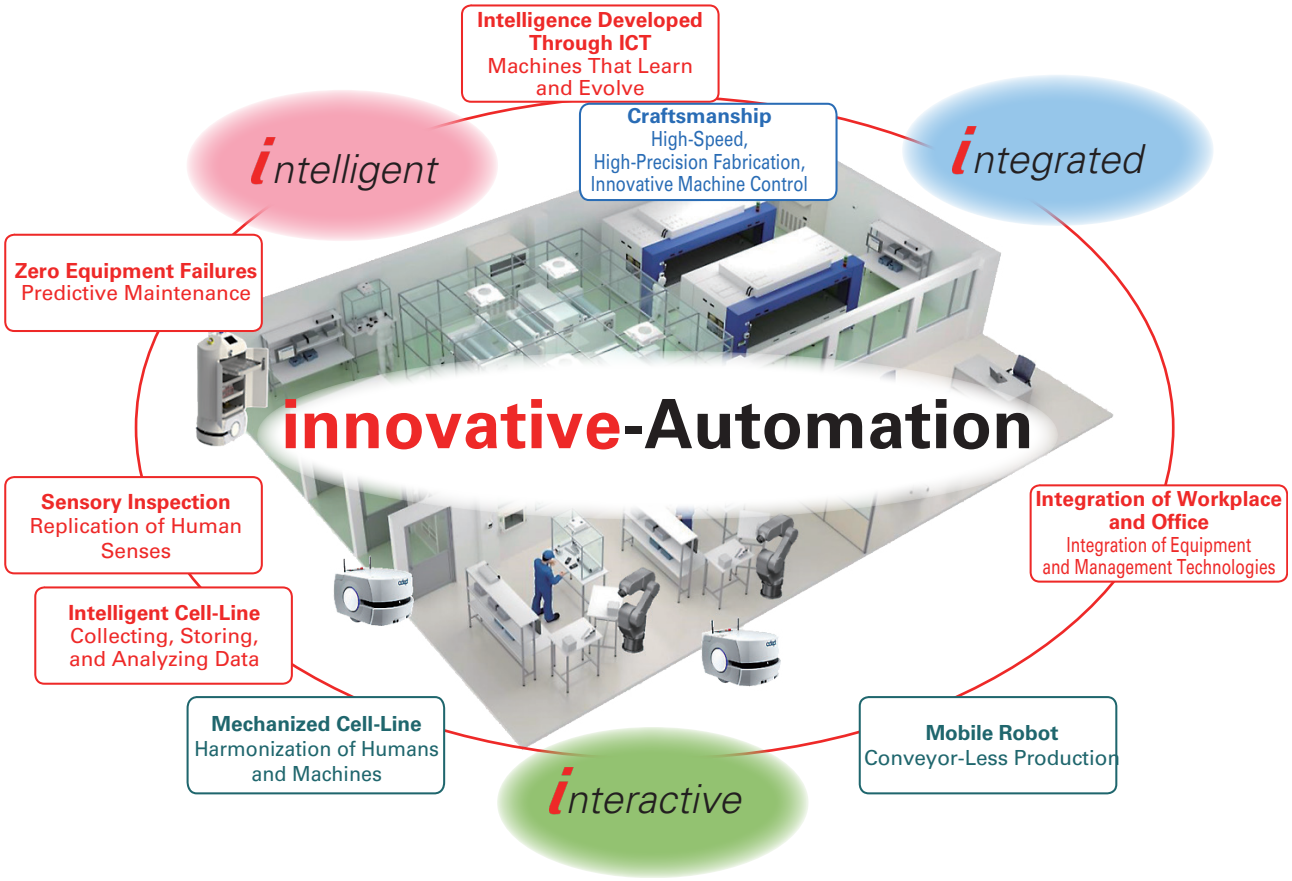
Production floors are entering a period of major transition. This includes changes of nee needs in manufactured items and methods, manufacturing locations, and manufacturing personnel. Changing needs in manufactured items and methods reflect urgent requirements to produce more advanced, more compact, high quality products associated with CASE*[1], 5G, and other industry changes. Changing needs in manufacturing locations have been affected by trade friction between the United States and China. This trade frictions lead to accelerated local production and consumption, requiring standard product quality from production sites distributed around the world and faster ramp-up of production facilities. Changing needs in manufacturing personnel reflect rising personnel costs and an aging society. Every manufacturer struggles with a serious shortage of personnel on production floor and skilled technicians, in particular. These needs rapidly increase as time passes.
Meanwhile, the pace of advancement is accelerating for AI, IoT, robotics, and other technological innovations and changes in seeds. These rapid technological changes will prove to be a tailwind in resolving the changing needs of production floors.

*1 CASE: Connected (connected vehicles), Autonomous (autonomous vehicles), Shared (shared vehicles), Electric (electric vehicles)

The Genesis of innovative-Automation

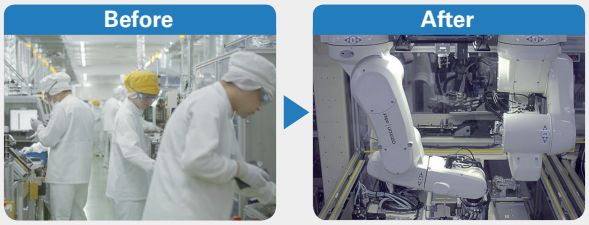
To use innovation in solving production floor issues, in 2016, we came up with the IAB value creation concept. This conistss the [three "'i"] of the innovations driving automation on the production floor. These concepts are **integrated** (evolution in control), **intelligent** (intelligence developed through ICT), and **interactive** (new harmonization between humans and machines). This is the intersection of changes in needs, changes in seeds, and OMRON's unique approach. Evolution in control refers to achieving ultra-high-speed and ultra-high-precision machine control. This is a combination between the IAB lineup of the widest range of control devices in the industry and software. Intelligence

developed through ICT refers to the incorporation of AI and IoT into all manufacturing control devices, driving machines themselves to learn and evolve. The ultimate goal is to create production lines that experience zero stoppages and create high-quality products with zero defects. A new harmonization between humans and machines means machines that autonomously move, working together with humans. The machine and the human each leverage their own strengths in cooperation, leading to a new reality for production floors.



Practical Implementation of innovative-Automation at the AISIN? AW Smart Factory

The Aisin AW Okazaki factory is the world's leading automotive parts manufacturer. This is an innovative-Automation Smart factory developed in cooperation with OMRON. Here, production floor innovations have become a reality. These innovations include ceiling-suspended electronic control unit (ECU) assembly robots and mobile robots that transport advanced board inspection equipment and parts autonomously.



Fully automated robots suspended from the ceiling install parts in devices and move parts between processes, tasks which formerly required 10 workers.

For more about this topic. OR Read more for a detailed article on AISIN AW smart factory.

Evolution of innovative-Automation

integrated (Evolution in Control)

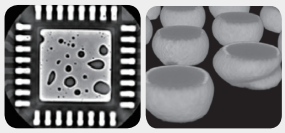
Increased Production of Many Innovative Control Applications Since the Birth of innovative-Automation

OMRON is the industry leader, offering 200,000 control devices across a wide range of applications. This advanced combination of overwhelming product lineup and software has achieved new levels of smooth, high-precision, and high-speed control. Specific advancements include vibration control technologies that use software to control sway, slip, and spillage that occur when transporting products, as well as high-speed synchronization control to precisely align different parts moving at high speed. We make investments in innovative control applications to respond to the ever-increasing range of problems encountered on production floors.

Solving Social Issues in the Automobile Industry Through innovative-Automation

Ongoing advancements in self-driving require highly precise and efficient inspection of entire control boards, which serve as the brains of these vehicles. The inspection of electronic control boards, on which sophisticated electronic components are mounted, is the most important production process in ensuring safe, automated driving. The electronic control board is used in areas such as braking and engine control which impact human lives directly. Errors cannot be tolerated. OMRON's Automated X-Ray Inspection System has solved this issue. This imaging inspection equipment uses X-Ray technology to visually inspect items mounted on the board. A unique characteristic of our technology is speed and accuracy. This enables continuous, nonstop capture of 3D images with a dramatic 2.3-times increase in speed compared to traditional methods.

Automated X-Ray Inspection System



Stereoscopic inspection image of electronic control board taken with automated X-Ray inspection system

[Employee Comments]

In 2007, we saw signs of a major transition in adopting tiny components used in consumer products for use in cars. OMRON has developed automatic inspection equipment incorporating 3D-CT technology *2 by using innovative-Automation control technology to provide a detection speed capable of handling mass production,. We will continue to provide high-quality inspection equipment, pursuing our mission to create vehicle safety and security.

Planning: Inspection System Business Department, Product Manager, Yujin Fujita

Our history of Automated X-Ray Inspection System development stems from repeated co-creation with customers, focused on creating something that will benefit customers. This philosophy gave birth to revolutionary Automated X-Ray Inspection System developed through design innovations that increase speed without compromising performance. The result is dramatic improvements to quality and maintainability.

Development: Inspection System Business Department, Development Department, Makoto Shichiro

We want to contribute to the safety and security of the world by promptly and reliably delivering world-leading Automated X-Ray Inspection System featuring optimal quality, cost, and delivery time. Reflecting this stance, we integrated production, development, and planning from the initial product planning stage. At the same time, we achieved a manufacturing system that can also respond to rapid increases in incoming orders. We are proud to be responsible for important inspection processes. We will push forward to solve more social issues and create value for our customers.

Production Manager: Ayabe Factory, Shusuke Fujiwara

*2 3D-CT technology: A technology that uses X-Rays to obtain continuous cross-sectional images of the interior of structures that are invisible to the human eye. 3D-CT technology processes these images via computer to generate 3D images. 3D-CT technology uses technology similar to that used in medical facility CT scanners.

intelligent (Intelligence developed through ICT)

OMRON's Main Battleground is in Real-world Automation

OMRON's main area of focus is in manufacturing innovations that make use of practical automation. Connecting OMRON's more than 200,000 different types of control devices to a network enables real-time collection of production line and device status. In April 2017, we introduced an industry first—a machine automation controller incorporating AI. In October 2018, we released the AI Predictive Maintenance Library for AI controllers. This technology creates learning devices that collect, analyze, and control vast amounts of workplace via an AI controller, resulting in zero-stop production lines that produce zero defects. We are working on further technical development using open innovation through a tie-up with AI venture company AISing Ltd. Launched in November 2018T this project is developing the world's fastest embedded AI.

interactive (New harmonization between humans and machines)

Humans and Machines Complementing Each Other's Strengths and Working in Harmony

OMRON aims to create new relationships between humans and machines on the production floor. In these relationships, humans and machines complement each other's strengths and work in harmony. Humans and machines, working together on the production floor as machines understand and complement human action and intention. This is the future of manufacturing. To this end, we acquired industrial robot company Adept Technology , in 2015. Today, we sell mobile robots worldwide, providing flexible, automated transport. In May 2018, we partnered with Techman Robot Inc., a Taiwanese collaborative robot manufacturer, aiming to advance cooperation between humans and robots on production floors. By adding an arm-equipped collaborative robot to our product lineup, we have accelerated toward the future of production floors in which humans and machines work in harmony.

Fiscal 2018 Initiatives to Enhance the Three "i"s

Taiwanese Collaborative Robot Manufacturer Partnership with Techman Robot Inc. (May 2018)

Techman Robot Inc. is the world's leading company in arm-equipped collaborative robots used together with humans on production floors. Technman Robot signed a strategic partnership with OMRON in the field of collaborative robots, which is experiencing rapid growth. Together, we work on the development of next-generation collaborative robots to bring innovation to production floors, where humans and machines work in harmony.

Collaborative arm robots

Embedded AI Development Venture Partnership with AISing Ltd. (November 2018)

AISing Ltd. is the world's leading AI venture company. AISing owns AI algorithms that enable high predictive accuracy and high-speed processing, using with even limited learning data. Through this partnership, we have developed AI engines for control devices. The goal of this project is to provide future production floors with smart production lines to prevent manufacturing product defects. This requires instantaneous collection of sensing data and feedback to machine controllers.


Announcement of partnership with AISing
(L) Fukui, General Manager of Technology Development Division
(R) CEO Dezawa, Representative Director of AISing Ltd.

*Read more for a detailed article on OMRON's partnership with AISing Ltd.

Further Evolution of the i-BELT Subscription Service

In 2017, OMRON launched i-BELT, a business model that offers innovative-Automation to customers. This is a subscription service in which OMRON engineers work together with customers at their production floors using data to provide service and maintenance, as well as to improve production lines. Working closely with customers on their production floors allows us to collect and analyze a range of data. This, in turn, allows us to identify issues and propose new solutions. Furthermore, the expertise in controls gathered from production floors leads to new businesses. By building closer, ongoing relationships with customers through i-BELT, we reproduce the craftsmanship required for tasks that include predictive maintenance for device abnormalities and the adjustment of cutting speed in fabrication equipment. These activities were once the sole domain of highly skilled workers.

Diagnostic Services at Customer Manufacturing Facilities

Further Expansion of Automation Centers

We will bring more innovations to production floors as we expand innovative-Automation and leverage i-BELT to continue building relationships with customers. What makes this possible is our Automation Centers (ATC), situated around the world, and our service engineers who work in close cooperation with our customers. The ATC is home to sales engineers who consider the equipment actually used by customers on their production floors. The goal here is to verify and test solutions that solve customer manufacturing issues. As of fiscal 2018, OMRON operated 35 ATC facilities, up from 17 in fiscal 2017. Additionally, sales engineers experienced in manufacturing increased 20 percent compared to fiscal 2016. Today, over 1,000 sales engineers are co-creating with customers to solve problems on production floors worldwide.

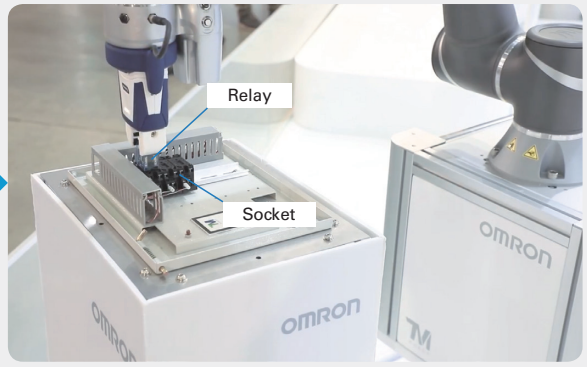
Sales Engineers Co-Create With Customers to Solve Production Floor Issues

A New Harmonization Between Humans and Machines, Driving innovative-Automation into the Future

Company founder Kazuma Tateishi proclaimed, "To the machine, the work of the machine; to humankind, the thrill of unfettered creativity." "To the machine the work of the machine; to man the thrill of further creation," OMRON strives to create a new relationship of harmony between humans and machines. In this world, machines do not take work away from humans. Instead, humans and machines work cooperatively.
At present, we are developing a Mobile Manipulator (MoMa) that works together with humans when and where required. We plan to introduce this new technology in fiscal 2019. MoMa is an arm-equipped mobile work robot that moves about freely. On-board detection technology helps MoMA avoid bumping into people and obstacles. This robot recognizes objects as images, allowing automation not only in transportation, but also in item stacking and assembly tasks. We are quickly heading toward a dream world in which numerous robots work in harmony with human employees as co-workers on production floors.
OMRON leverages innovative-Automation to create production floors around the world that enrich the lives of workers and consumers. The challenges to innovate on ever-changing production floors are never-ending. innovative-Automation will continue to evolve into the future.

Mobile Manipulator


The Mobile Manipulator Stacking Products



The Mobile Manipulator Inserts Relays into Sockets for Assembly

Electronic and Mechanical Components Business (EMC)

Supporting OMRON Development Device and Modules

Corresponding SDGs

Vision

Provide Leading-Edge Electronic and Mechanical Components Globally Through Advanced Manufacturing Capabilities

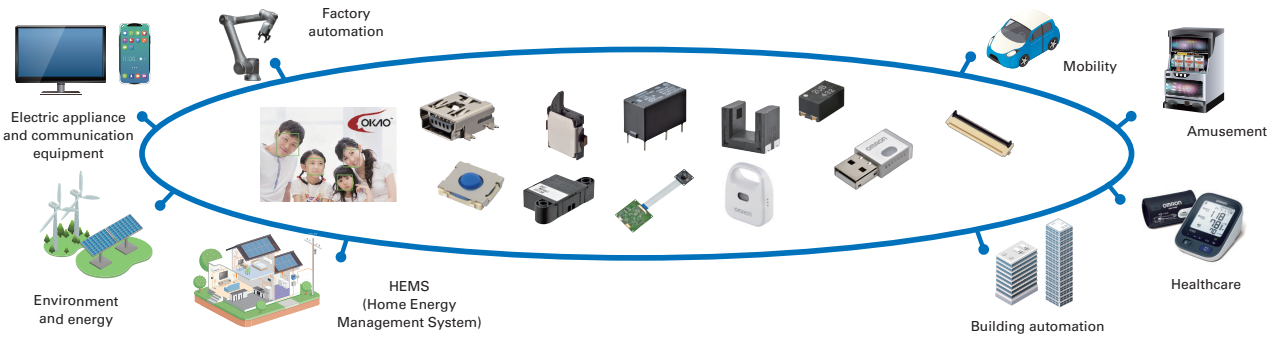
Our Electronic and Mechanical Components Business leverages extensive success in core products (relays, switches, connectors, etc.) to offer a wide product lineup of devices and modules that meet diverse customer needs. Digital products have become an intimate part of our everyday lives, making society more convenient. These products include smartphones, home appliances (air-conditioners, refrigerators, and microwave ovens), and industrial equipment (from vehicles and machine tools to automotive fields). We provide advanced electronic and mechanical components which use cutting-edge technologies and manufacturing capabilities honed over many years. This support the society by connecting people and machines across a wide range of fields.

Managing Executive Officer
Company President, Electronic and Mechanical Components Company

Shizuto Yukumoto

The Electronic and Mechanical Components Business, Growing Together With OMRON

The relay technologies became the basis to establish the Tateishi Electronics Company by our founder Kazuma Tateishi The relay technologies refined by our founder Kazuma Tateishi Inoue Electric Manufacturing Company became the basis upon which the Tateishi Electronics Company was later established. A relay is a part that receives an external electrical signal to turn an electrical circuit on and off. Relays are also used for switching. Relays that are incorporated in electronic devices receive an electrical signal, turning a switch on or off to transmit the signal to another device. For example, pressing a button on a remote sends a signal to a relay within the television, which turns the main power switch on. Relay has many types depends on the amount of electric current,and circuits, and application. This technology eventually led OMRON to the development of the world's first contactless switch, the driver behind our rapid advancements in this age of machine automation.
In these days, our relay technologies are used in high-capacity DC relays for hybrid and electric vehicles and supporting the high demand. In the same way, the range of technologies underpinning the Electronic and Mechanical Components Business have developed in step with changes in society and are used for many familiar products in our daily life. For example, the face detection technology, (the OKAO Vision) is used in digital cameras and other devices to detect human faces automatically. Ultra-compact, advanced MEMS microphone chips are used in compact microphones for mobile devices.
Sensor technologies were initially utilized in automated production floors, and now those have been adapted to detect human movements. These detectors provide notice of guest arrivals and are used as environmental sensors in agricultural applications. In fact, sensors are useful in various scenes as part of the social infrastructure.

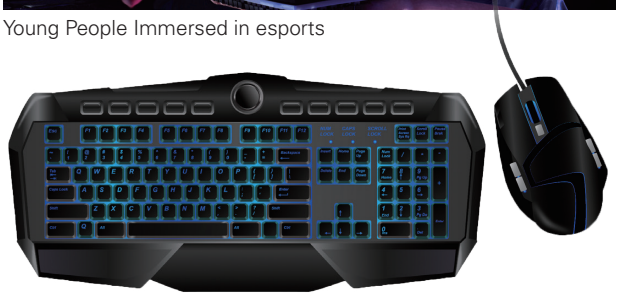


Electronic Components That Support Society

The Electronic and Mechanical Components Business in the Coming Smart Society

Our strength lies in our ability to develop products and in our reliable production capabilities. This has been developed since our very founding and to meet the changing needs of customer requirements for advanced, compact, and quickly delivered electronic and mechanical components.
As we look ahead to the society of the future and a rising number of smarter products, OMRON will use our strengths to provide a broad range of electronic components that meet customer needs.
An example of this is mouse and mechanical keyboard switches used in the rapidly growing esports market, which has competitive population over 100 million people. In esports, players are required to perform the quick and delicate movements. Accordingly, these players are very particular about the touch and click feeling of mouse and mechanical keyboard switches. OMRON measurestouch and click feeling of switches that players feel comfortable. Then we visualize and quantify that data to create switches customized to individual needs. This is possible precisely because OMRON has been working closely with customers for long years i which led to perfecting our technologies.
Since our establishment, our electronic and mechanical components technologies have been developing throughout history These technologies remain as a foundation supporting a variety of OMRON businesses in these days

Young People Immersed in esports



Well-Regarded esports Mouse and Keyboard Switches

Robust Restructuring for the New Step of Growth

The smarter home appliances and factory automation will accelerate even more. This trend is supported by advanced and high quality electronic and mechanical components. To provide a stable supply of components, OMRON is engaged in structural reform of our production, focusing on optimizing production centers and increasing production capacity. We will continue to provide advanced electronic and mechanical components across the globe to support world-wide development in society.

Restructuring Production: Relocation and Major Expansion of Our Shenzhen Factory

Electronic components are essential in creating innovation in new markets such as smart communities. To meet the various needs of our customers and provide large quantities of high-quality electronic components at low cost, we have carried out major reforms to the structure of our production system.
Details of this plan include relocating and expanding 36 production lines for products such as relays, switches, and connectors. At full capacity, these lines can produce products worth an additional ¥10 billion in sales.
This lage relocation and expansion project required the use of 370 trucks. Reconfiguring our quality systems and facilities, as well as major changes in how we source and train industrial engineer , has resulted in our quality control receiving high praise from customers, leading to increased orders. Furthermore, our improved delivery times have contributed to increased value for customers.

OMRON ELECTRONIC COMPONENTS (SHENZHEN) LTD.
Dong-Hua Yuan

Automotive Electronic Components Business (AEC)

Domain **Mobility**

Corresponding SDGs

Vision

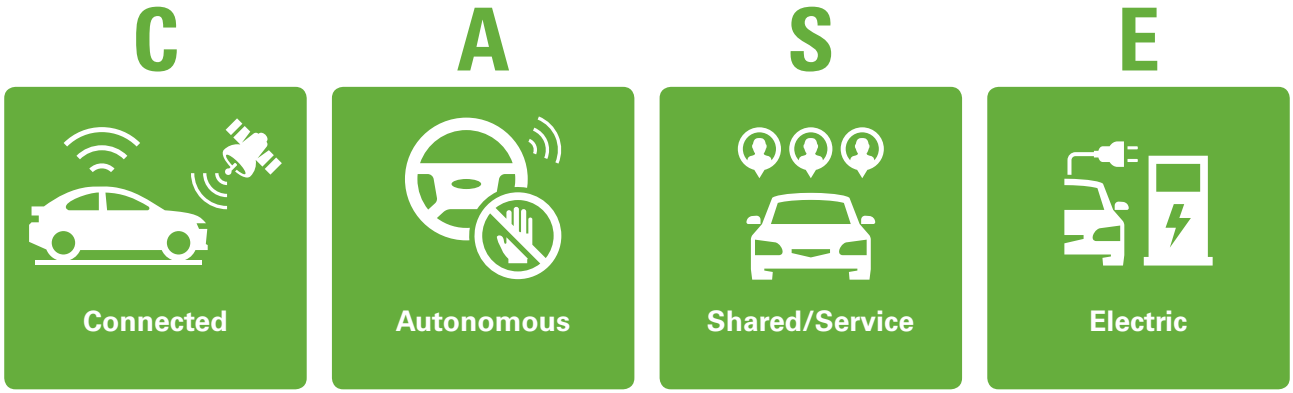
Contributing to a Seamless Relationship Between People and Automobiles in the Future Car Society

The Automotive Electronic Components Business (AEC) provides products aimed toward a safe, secure, and comfortable car society. The mission of the AEC is to contribute to a seamless relationship between people and automobiles through our in-vehicle products. We provide car electronics essential for advanced automotive functionality. Looking to the car society of the future, the AEC continues to develop manufacturing capabilities that will let us play a role in a more safe, secure, comfortable, and clean mobile society for people around the world.

Managing Executive Officer
OMRON Automotive Electronics Co. Ltd.
President and CEO **Katsuhiro Wada**

Social Issues to be Solved by the Automotive Electronic Components Business

Automobiles have spread throughout the world as a convenient form of transportation. This convenience, however, comes at a cost. One is a rising number of deaths due to traffic accidents. Here, OMRON and others are developing technologies related to safe driving assistance. Another issue is the increasing number of deaths in emerging economies attributable to respiratory diseases resulting from automotive emissions.
CASE: Connected, Autonomous, Shared/Service, Electric is a trend leading to the next-generation mobility society. The development of CASE offers new value in terms of product configuration, value chain, and the ideal form of business model. At the same time, we are seeing this industry evolve, including accelerated collaboration, selection and concentration, forays into different industries, and changing business formats.



An Evolution in Manufacturing for Self-Driving and Automotive Electrification

To raise our contribution to safety, security, and environmental friendliness, we focus on products vital to connected and electric-based driving based on the four industry changes called for under CASE (Connected, Autonomous, Shared/Service, Electric). We have two particular strengths here: Active safety for automated driving and power supply control for electrification.
We deploy advanced forward-recognition technologies in the field of advanced driving support and other areas of active safety to help make automated driving a reality. We incorporate on-board driver protection technologies that determine whether a driver is concentrating on driving, and we are developing products and services for advanced sensing inside and outside the vehicle. In this way, we create new value in driving support and safety.
Our power supply control products use DC/DC voltage converters capable of high-efficiency power conversion used in electric vehicles. This is one way in which we meet customer requirements for the new mobility society.
Our ultra-high-efficiency power units increase the performance of electric vehicles and environmentally friendly devices to convert DC voltage efficiently.

An Innovative Production Model Line for Eco-Friendly DC/DC Converters

DC/DC converters are an essential component for electric vehicles. Compared to other products manufactured at OAE(Omron Automotive Electronics), DC/DC converters are relatively large and heavy with a large number of components. These products are also very complex to assemble. Production line design was extremely challenging given the customer requirements for stable high quality.
To overcome these challenges, we chose to pursue a new production model line concept rather than attempt full automation. This concept incorporated an optimal relationship between human and machine, a production line producing only quality products, and non-stop production. Our ongoing efforts to meet these challenges has led to co-creation in our production technologies, leading to innovative production model lines and greater appreciation by our customers.
Nothing great is ever achieved without taking on challenges. We had the courage to take the first step and to keep believing in our job, all the while maintaining a steady focus on the OMRON Principles and the needs of society. Our insistence on involving other parties was on key leading to the success of this large, global-scale project.

Production Control Office
Production Technology Division

Kazuya Tanaka

Mobility 3.0 is an Engine Driving the Future

Aiming for a zero-accident, clean car society, OMRON will continue to pursue evolution in electronics and technologies closely linked with vehicles.
OMRON continues to evolve our Sensing & Control technologies and manufacturing capabilities. These technologies and capabilities include sensors for advanced driving support and self-driving control, used to prevent automobile accidents, as well as motor and voltage control components for improved fuel efficiency. We are taking on the challenge to create a mobility society that is safe, secure, comfortable, and environmentally friendly.

OMRON's Goals for Mobility Society

Social Systems, Solutions and Service Business (SSB)

Domain: Mobility / Energy Management

Corresponding SDGs

Vision

Creating a Society in Which the People of the World Live in Safety, Security, and Comfort ~Achieving a Smart Society~

The Social Systems, Solutions and Service Business (SSB) provides a range of systems that underpin the infrastructure of society. These systems include railway station systems (automated ticket gates, ticket vending machines, etc.), traffic and road management systems, accounting systems, IoT solutions (power and data protection, etc.), and energy management. This segment provides software-based solutions built on core technologies used by railroad, road operations, and other infrastructure companies. The SSB also constructs solutions through comprehensive maintenance services. Together with our customers, we contribute to building a better society. We confront the social issue of worsening labor shortages via *social automation* that utilizes IoT, AI, and other advanced technologies combined with our proprietary service and data platforms. Our aim is to create a smart society in which anyone can live in safety, security, and comfort.

Managing Executive Officer
OMRON Social Solutions Co., Ltd.

President and CEO **Toshio Hosoi**

Issues Facing Japan's Social Systems

Japan's declining labor base has triggered a variety of inconveniences in Japanese society. These inconveniences have become evident and more serious, including declines in transportation services, difficulties in maintaining the functions of smaller cities, and deteriorating social infrastructure. At the same time, social systems face a wider range of demands, including higher inbound tourism and heightened safety and security requirements related to disaster prevention and mitigation, etc.

Social Systems, Solutions and Service Business Initiatives

The SSB has identified four new business domains to confront social issues that will become all-the-more serious in the future. In addition to the fields of transport (rail, police) and energy, we are expanding into other fields of lifestyle services, aiming to create safe, secure, and comfortable lives for all. We are also striving to build autonomous regional communities as part of our overall efforts to solve social problems. The strengths of this business lie in consulting (industry knowledge), equipment and software development, design, and manufacturing, as well as maintenance and operation services. In other words, the SSB provides one-stop solutions for customers throughout Japan.*

*A business methodology that categorizes operations flow by function, aiming to improve efficiency and competitiveness

Social Systems, Solutions and Service Business Domains

New Social Systems, Solutions and Service Business Initiatives Looking Ahead to 2030

The Social Systems, Solutions and Service Business (SSB) is active in the four domains of transportation, energy, lifestyle services, and community. In the community domain, the SSB uses a storehouse of expertise to work with local governments, such as Maizuru City (Kyoto Prefecture), to launch initiatives for creating a smart society looking ahead to the year 2030. The genesis of this project was a suggestion from OMRON SINICX Corporation, an OMRON company facilitating open innovation.

Case Study: Initiatives with Maizuru City

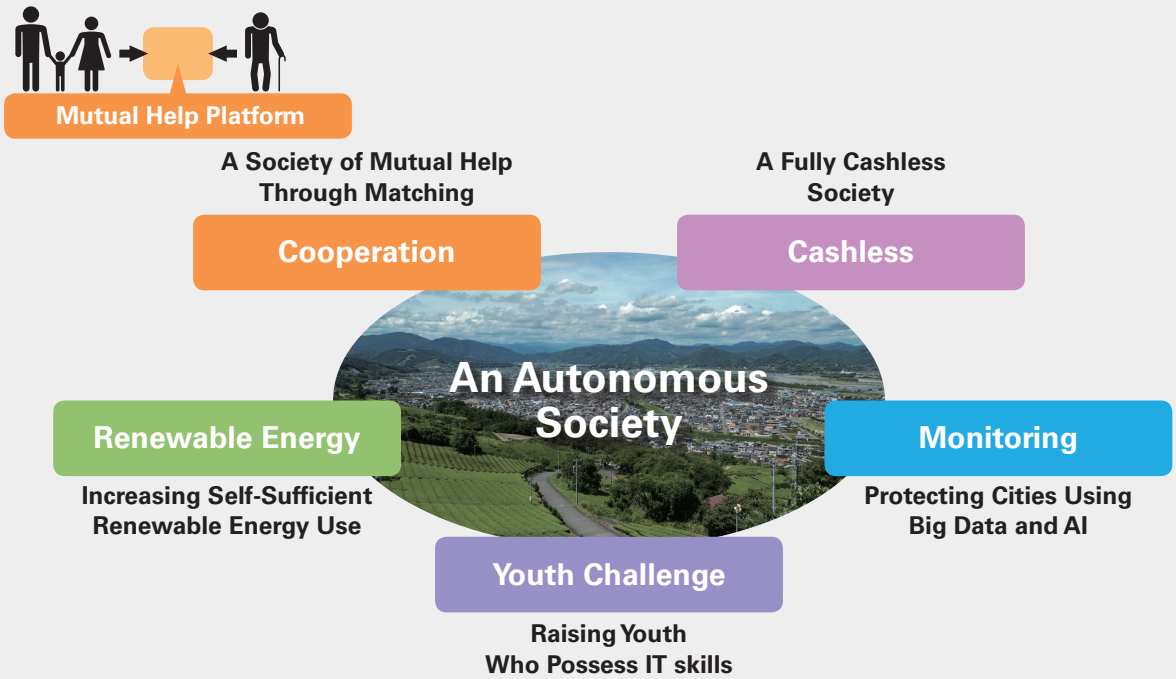
Regional cities in Japan are seeing continuing declines in population. This means a shrinking revenue base for local governments, which makes providing satisfactory services to residents more difficult. To solve this problem requires regional cities become autonomous. By "autonomous," we mean cities that make the most of their resources for their own betterment, that look for ways in which residents can enjoy physical and mental health, that offer help when needed, and that encourage residents achieve their own desires.
Our efforts in Maizuru City (Kyoto Prefecture) are leading toward a cooperative, fulfilled society that utilizes IT to help each other. We believe that projects forming connections between people, between people and communities, and between communities and communities create closer relationships in which people look out for one another. In this case, we are developing a matching system in which those requiring help with various aspects of daily life can connect to those willing to provide help.

The key to success for this type of matching system is to tailor to the needs of the local community and environment, designing in *trustworthiness guarantees* and *incentives*. This is in contrast to general matching systems used in major metropolitan cities and overseas. The team formed by Maizuru and OMRON is current conducting local surveys and validation tests for the system. Many challenges exist in creating a new type of cooperative story that has no monetary objective. We believe that solving these problems one-by-one will help Japan's regional cities achieve sustainable growth.

NEXT Business Headquarters Project Leader

Miki Yokota

The Social Systems, Solutions and Service Business Vision of Japanese Local Government in 2030



Healthcare Business (HCB)

Domain **Healthcare**

Corresponding SDGs

Vision

All for Healthcare, To Help Realize Healthy and Comfortable Lives for People Around the World

Healthcare Business provides medical equipment and services that contribute to the healthy and confortable lige of everyone around the world. Over 40 years in the blood pressure monitor business, we have earned trust in our highly accurate devices used in clinical practice and certifications that guarantee levels of quality and safety worldwide. These are the greatest strengths of our business.
We intend to move forward actively in developing innovative devices and promoting digital health across three main areas of focus: cardiovascular, respiratory and pain management business. By providing personalized medical devices and services tailored to individuals, we will confront the challenges in preventing theprogression of diseases and in increasing healthy life expectancies.

Managing Executive Officer
OMRON HEALTHCARE Co., Ltd.
President and CEO **Isao Ogino**

Social Issues Confronting the Healthcare Market

The growing middle class population in emerging economies are a cause of rising lifestyle diseases in these countries. Developed countries are experiencing a growing gap between average life expectancies and healthy life expectancies, stemming from the super-aging societies. And the increase of medical costs has been a major social issue globally. Our three focus domains, which target numerous patients and pre-symptomatic individuals, are particularly positioned to meet these demands.
The first of these domains is cardiovascular. This includes strokes and cardiac infarctions, which are caused by blood pressure attributable to changes in dietary and other lifestyle habits. 17.5 million people have been suffering from these diseases, and it costs approximately ¥120 trillion to treat medically. The second domain is respiratory diseases, which are increasing worldwide due to air pollution and other factors. Respiratory disease is believed to affect 440 million people worldwide.
The third domain is pain management. This includes lower-back and joint pain, which can interfere with daily life. Approximately 73 million people in Japan and the United States suffer from chronic pain. Many rely on medications to alleviate their conditions.

Cardiovascular diseases	Respiratory diseases	Pain management
Patients with brain/ cardiovascular events*1	**Global patients suffering from respiratory diseases*2**	**Patients suffering from chronic pain in Japan and the U.S.*3**
17.5 million	**440 million**	**73 million**
Medical costs related to cardiovasular diseases*4	**Medical costs related to respiratory diseases in Japan and the U.S.*5**	**Market for analgesics in Japan and the U.S.*6**
¥120 trillion	**¥19 trillion**	**¥2.4 trillion**

*1 WHO report
*2 International Respiratory Societies report
*3 Pain in Japan (Japan), National Health Interview (U.S.)
*4 Estimate based on World Bank and OECD data
*5 Estimate based on data published by the Ministry of Health and Welfare, the European Respiratory Society, and a survey conducted by Creative Biotech Inc
*6 Global Analgesic Market Survey 2013

Achieving Zero Events on Cerebrovascular and Cardiovasucular

Going for Zero refers to preventing the onset of serious of disorders (events) such as strokes and myocardial infarctions that are caused by high blood pressure. New sensing devices measure vital data both during daytime activities and at night. This has been difficult to achieve in the past. By analyzing this newly accumulated data, we can provide more effective high blood pressure diagnosis and treatment services, all with the aim of achieving Going for Zero.

Unveiling innovative devices

The HeartGuide™ is the world's first wearable blood pressure monitor in a unique compact wristwatch configuration. The HeartGuide™, which has received medical device certification, has been released for sale in the United States. Wearable blood pressure monitors track fluctuations in blood pressure throughout the day with medical-grade accuracy, a task difficult to achieve in the past.

Wearable blood pressure monitor released in December 2018 HeartGuide™

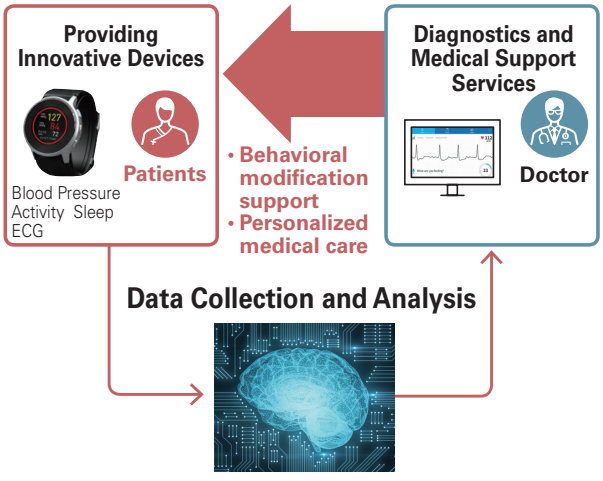
Achieving Zero Events requires the stress-free measurement of blood pressure during everyday living. OMRON blood pressure monitors have always been high-quality devices trusted by physicians. However, the bulky design remained an impediment to everyday carry. The advent of our compact wearable HeartGuide™ lets users participate easily in their own health care by tracking their own health status at any time.

Reducing the size of the device while still meeting standards for medical devices was no mean feat. The product required significant efforts in development. Given the importance of HeartGuide™ success in achieving Zero Events, OMRON staff worldwide united behind the product to ensure its status as a global top brand. HeartGuide™ was first unveiled in North America at the January 2019 CES event, the world's largest consumer electronics show. Our device was featured in articles and reports by many media outlets. Sensing the excitement behind HeartGuide™, our staff around the world will use these expectations as a source of pride and confidence to accelerate ongoing development.


Omron Healthcare, Inc. (USA)
Executive Director
Product Strategy and Technology
Jeff Ray

Promoting Going for Zero through the integration of devices, evidence, and services

OMRON blood pressure monitors are used in many major clinical studies. The medical evidence obtained in these studies enables the creation of diagnostics and medical support services in connection with hypotensive evidence stemming from behavioral modification support programs and medication optimization support programs. We intend to provide these services, including telemedicine and corporate wellness services, tailored to cultures, lifestyles, and medicine and insurance systems for each country to achieve Going for Zero.



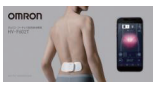
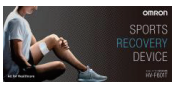
Personalized medical care to achieve Going for Zero

Aiming Asthma Attack Zero

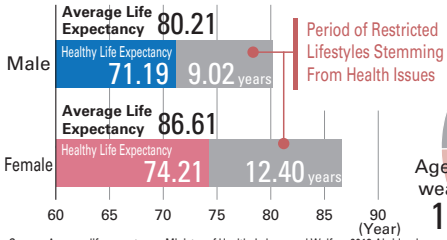
Families who have a child with asthma are all too familiar with the daily worry of asthma attacks and when to administer asthma medicine. The OMRON respiratory business strives for ease of use and easy care for nebulizers, which are used by patients to inhale asthma medication. We are developing new sensors and services that detect and analyze the sound of wheeze which typically accompanies with an asthma attack. We intend to use this technology in devices for early detection of the symptoms of asthma attack. Through these initiatives, we contribute to the prevention and mitigation of asthma attacks, which can be serious in small children.

Unveiling Devices to Reduce Knee and Lower-back Pain, Extending Healthy Life Expectancies

Japan is experiencing a widening gap between average life and healthy life expectancies. This gap, quickly becoming a social issue, is approximately nine years for men, and 12 years for women. The main barriers to healthy living (cause of nursing care) are motility disorders such as joint and back pain.
The pain management business has unveiled a number of new devices in this field. These new products include Knee TENS that applies electrical stimulation below the knee to alleviate knee pain. This device is used for walking support by people who started feeling knee pain. We also offer Wireless TENS to aid recovery from the so-called national disease of back pain. Athletes also use this product for muscle pain relief. By relieving the pain and physical fatigue that hinder people in their daily lives, we can maintain and improve quality of life, and bring about a society in which people enjoy active, healthy lives, regardless of age.

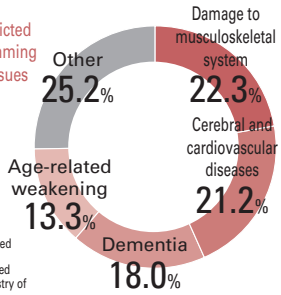
Knee Pain of senior generation	Lower-back Pain, Widespread in Japan	Fatigue Recovery for Athletes
		
HV-F710 Knee TENS	HV-F602T Wireless TENS	HV-F601T Wireless TENS
Released in December 2018	Released in November 2018	Released in November 2018

Gap Between Average and Healthy Life Expectancies



Source: Average life expectancy, Ministry of Health, Labour and Welfare 2013 Abridged Life Table
Life expectancies extracted from Ministry of Health, Labour and Welfare 2013 Abridged Life Table, 2013 Demographics Statistics, 2013 National Livelihood Survey; and Ministry of Internal Affairs and Communications 2013 Estimated Population

Main Causes Requiring Nursing Care



Pain Management Product Department
Yoshito Asai

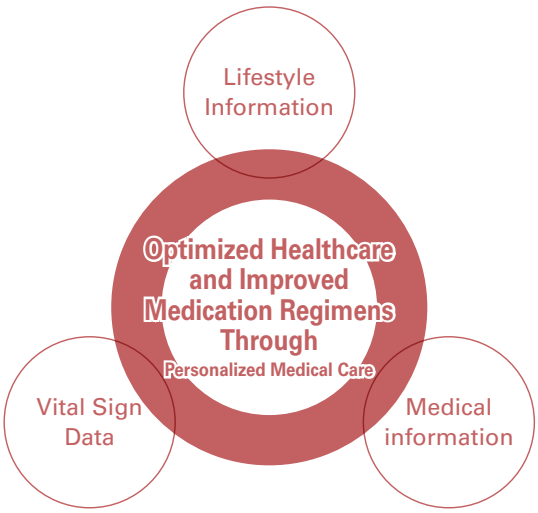
To prevent and relieve knee pain, the muscles that support the knee must remain strong. Walking is a very important preventive measure. However, the act of walking for people suffering from knee pain can be a challenge, both physically and mentally. Unable to put up with this pain, people often stop walking, which leads to a negative cycle of decreased muscle strength and even further aggravation in muscle pain. Knee TENS supports the knee during walking, while providing electrical stimulation to relieve knee pain.
This device makes walking easier, helping strengthen the muscles and creating a positive cycle which prevents and mitigates knee pain.
We want to improve the quality of life for as many people who suffer from knee pain as possible, stopping the negative circle of locomotive syndrome, the resulting difficulty in walking, and the need for nursing care.

Further Advances in Our Matsusaka Factory, Global Base of OMRON Manufacturing

In March 2020, our Matsusaka Factory will be as OMRON's global base for manufacturing capabilities. The factory will play a bigger role as our mother factory supporting global production, serving as a production center for cutting-edge manufacturing technologies to be deployed worldwide, focusing on low-cost, flexible automation. Advanced automation will result in a three-fold production gain, as well as optimized production that can respond flexibly to diversifying products and customer demands. Further, we intend to deploy leading-edge production lines built in Japan to production centers worldwide.
OMRON is developing high-quality automation, precision processing technologies, and improved quality control in pursuit of the providing high-quality products faster and in a more stable manner.

Towards the Future of Personalized Medical Care

The OMRON Healthcare Business has developed innovative devices, accumulated and analyzed data in collaboration with medical professionals, provided highly reliable services stemming from these collaborations, and produced advanced manufacturing technologies and modularization. These activities have created business models to promote healthcare. We will continue to focus our effort on cardiovascular, respiratory, and pain management fields, accelerating our pace as we go. Leveraging overwhelming global market share, we will combine and analyze information on vital signs, treatment, and lifestyles to create diagnosis and treatment support services tailored to the individual.



Energy Management Businesses

Domain: Energy Management

Corresponding SDGs

Vision

Using Energy Conversion and Control Technologies to Popularize the Use of Renewable Energy and Contribute to a Sustainable Society

Energy Management Business is working to spread the use of renewable energy to curb CO_2 emissions. Our aim is to create a society in which all people live in comfort. We contribute to energy efficiency through storage control technologies that support energy management, as well as through "the visualization of energy use" and other advanced initiatives. Further, We are involved in quality and functional improvements in all processes, from planning through to maintenance management. We are striving to be No.1 business partner in the field of environmental business. By leveraging our unique value chain to support the entire energy life cycle—from "efficient energy creation "to "effective energy storage" to "wise energy use"—we contribute to the creation of a sustainable society.

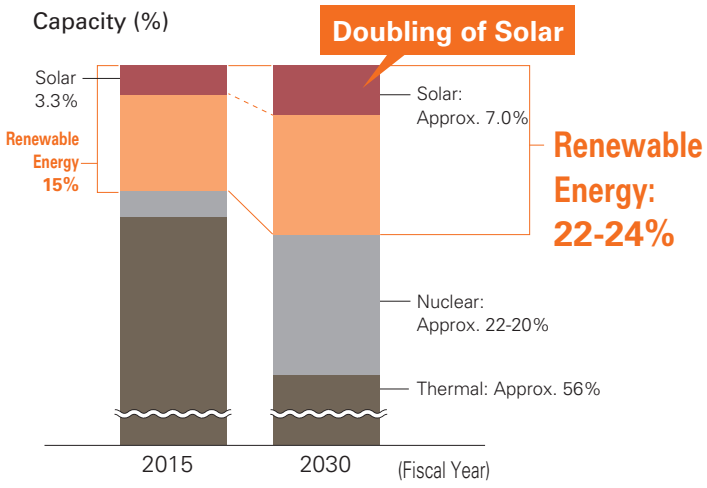
Executive Officer
Senior General Manager, Energy Management Business HQ
Taisuke Tateishi

Issues Confronting the Energy Management Market

Global climate change resulting from rising CO_2 emissions, the depletion of fossil fuels, frequent natural disasters, and soaring fuel costs, demonstrate the need for more use of clean energy in society. In corporate activities, we see a movement to rethink energy usage systems, including the effective use of renewable energy. Additionally, there is an urgent need to adapt to rapid changes in environmental laws and regulations and BCP*1. In response, we see global measures to reduce greenhouse gas emissions in line with COP21*2. Japan has set a goal to increase the ratio of renewable energy used from 15 percent in 2015, to between 22 and 24 percent by fiscal 2030. Japan also expects to double the ratio of solar power, from 3.3 percent to 7.0 percent.

More effect use and delivery of optimal control for power conditioners in solar power and energy storage systems will help spread renewable energy. This, in turn, will lead to reductions in greenhouse gas emissions, which is required to bring about a sustainable society.

Energy Source Structure Targets for Japan



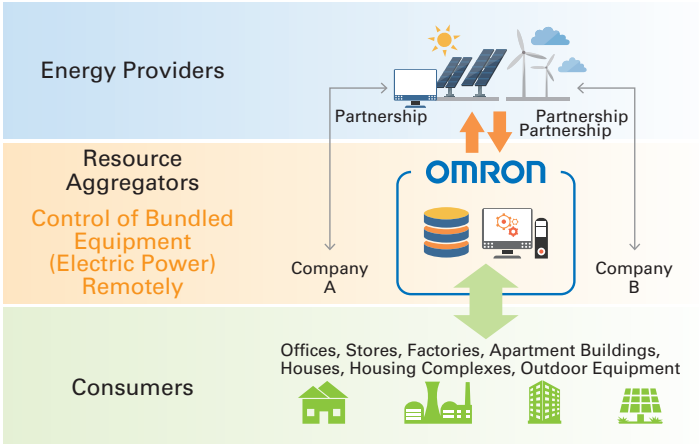
(Source:) Ministry of Economy, Trade and Industry, isep

*1 BCP (Business Continuity Planning): A plan to determine activities to be performed at normal times as well as methods and procedures to ensure business continuation during emergencies, while minimizing the impact on business assets and allowing for the continuation or rapid recovery of the core business in the event that a company is confronted with an emergency such as a natural disaster, major fire, or terrorist attack.

*2 COP21 (Conference of Parties to the Framework Convention on Climate Change): A conference held in Paris in 2015 to discuss measures to respond to global warming from 2020 onwards, and to determine a new international framework to replace the Kyoto Protocol.

A Total Energy Management Solutions Provider

The volume of power generated by renewable energy fluctuates depending on the weather. Stable electricity levels are necessary if we are to use energy from renewable sources. Given our energy conversion and control technologies, OMRON focuses on renewable energy generation and the utilization of information related to energy usage. We are working on the challenge of achieving stable electricity via control through bundled batteries. We aim to stabilize electricity to maximize the use of renewable energy, as well as to create a society rich energy.



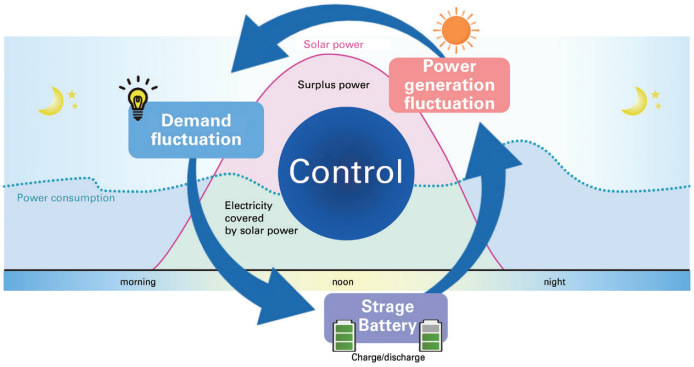
The Role of Resource Aggregators in Linking Energy Companies and Consumers

Recently, I have come across the phrases *population decline* and *aging society* with much more frequency. Each time I return to my hometown, I see more small shops shutting down and fewer buses running. Renewable energy that generates stable income from natural energy sources can be a big step toward solving these social issues. Our team thought through every scenario considering customer value and business models to encourage the adoption of photovoltaics and storage batteries. Ultimately, we came up with a model (service) that provides value for everyone. At present, we are using good customer feedback as our motivation to carry out business reform in selling services that encompass entire organizations.

Environmental Solutions Business HQ
Marketing Division
Yoshinori Kawai

Energy Usage With No Waste ~Building Storage Solutions~

The end of fixed-priced purchasing (FIT) and measures to counter power due to natural disasters are just two elements that have accelerated the need for more energy that combines solar power generation with storage batteries. To this end, OMRON is developing energy control technologies that incorporate storage batteries consisting of different current and voltage characteristics. We are also participating in verification tests for electricity charge-discharge controls to increase electricity usage efficiency in buildings, as well as tests for electricity stabilization within defined areas. OMRON will continue to hone our proprietary technologies to expand storage battery solutions.



Sensing demand and solar power status, balancing electricity supply through storage battery control

Spreading Renewable Energy

OMRON has taken up the challenge to achieve better energy management by linking renewable energy and storage batteries. This involves efficient energy creation, effective energy storage, and wise energy use, focused on energy conversion and control technologies. In the future, we intend to expend the scope of energy control to V2X, which takes advantage of electric vehicles. We also intend to achieve further improvements in building and structure energy efficiency. By bundling and controlling existing energy resources and stabilizing electrical power within defined areas, we can contribute to the further spread of renewable energy and to the creation of a sustainable society that has no impact on the environment.

Human Resources Management

Corresponding SDGs

Accelerating the Growth of Our People and Our Organization, the Drivers of Innovative Creation

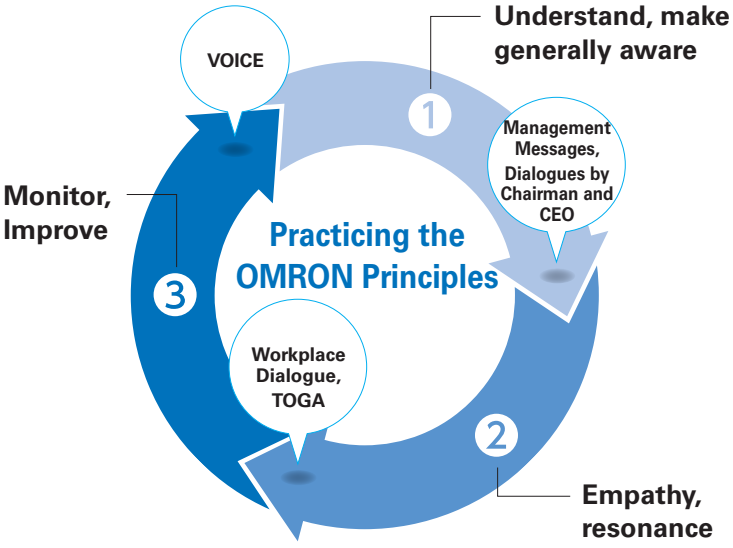
Employees are the most critical element to perform management based on the OMRON Principles. As employees supporting the growth of OMRON, we enjoy our work and commit to building an attractive company that accepts the challenge of creating social needs that solve social issues. The human resources strategy goal under VG2.0 is to create a strong company that fosters our people, provides an enjoyable work environment, and encourages high performance. By accelerating the growth of our people and our organization, drivers of innovation at OMRON, we raise our ability to create social needs. We have defined three key global initiatives to accomplish this goal:

Executive Officer,
General Manager, Global Human Resource Strategy Department,
Virendra Shelar

Key Global Initiatives

- Foster leaders who will drive management and business
- Hire, train, and make effective use of a diverse employee base
- Encourage self-motivated employees

These key global initiatives are tied closely to the OMRON Principles. In particular, we would like to foster leaders who drive management and business. These are people who look at society from a future-oriented perspective, who always think and act in pursuit of the true issues, who declare and pursue high goals, and who act with integrity at all times, no matter what the business environment. These are all examples of living values that reflect the OMRON Principles. OMRON engages in three unique processes to place our human resources strategy in position to raise the ability of all employees to practice the OMRON Principles. These processes strengthen the OMRON Principles by creating understanding and general awareness, encouraging empathy and resonance, and incorporating monitoring and improvement activities. The first process is to create an understanding and general awareness of the OMRON Principles internally. Here, management engages directly with employees through dialogues to further employee understanding and inspire employees to demonstrate leadership in practicing the OMRON Principles.
The second process is to share examples of employees putting the OMRON Principles into action to encourage empathy and resonance. A major part of this process is the OMRON Global Awards (TOGA), which we have held every year since fiscal 2012. We recognize the outstanding efforts of employees that lead directly to solving social issues, which inspires others to see ways to practice the OMRON Principles in their own sphere.



The third process is VOICE*, an engagement survey to monitor issues identified directly through employee input, which we then use to improve management issues.
Through these processes, we raise the ability of employees to put the OMRON Principles into practice, leveraging and accelerating Diversity & Inclusion as the source of Innovation, enjoying our work while striving to build an attractive company that creates social needs.

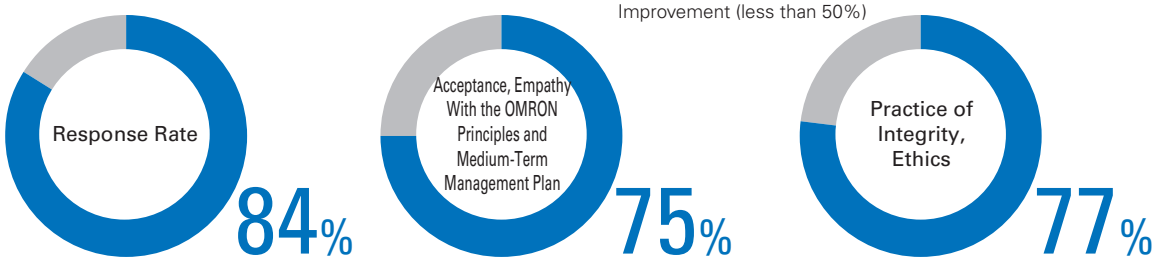
*VOICE:
VG OMRON Interactive Communication with Employees

Linking Direct Input by Employees to Solving Social Issues

OMRON implemented the VOICE engagement survey in 2016 for management to listen directly to feedback from our global workforce. This is an initiative for OMRON management to ensure sustainable growth, measuring the attractiveness of OMRON as a workplace, understanding and identifying management issues, and taking action to solve those issues. Based on VOICE results, management engages in discussions and continues to conduct reforms to make OMRON a more attractive company in which to work.
Based on results from the previous year, OMRON adopted and further strengthened our global communications infrastructure during fiscal 2018. We also revised IT systems and engaged in other operations process innovations during the year. In response to the expectations of our highly motivated employees in Japan who are ready for new challenges, we worked to create an environment and mechanisms to provide for a diverse range of opportunities. As one example, we introduced a system for recruiting employees to existing openings in other departments. We also created an application system, providing employees with opportunities to advertise their talents and challenge themselves at new jobs. In addition to collecting and scoring data, OMRON solicits free-form comments from employees directly. Based on these comments, management identifies true needs and formulates next steps. OMRON will continue to use VOICE results as a basis to further improve management decision-making speed, to strengthen our communication as an organization, and to identify other important issues that spur management discussions and reforms.

Fiscal 2018 VOICE Results (Summary)

Willis Towers Watson Evaluation of Affirmative Responses: Healthy (70-80%), Requires Support/Progress (50-70%), Requires Improvement (less than 50%)



The Contributions of Each Individual Create an Ideal Workplace

~Aiming for Effective, Open Communications~

OMRON MANAGEMENT CENTER OF ASIA PACIFIC
Newton Giraud

Statistics from OMRON's fiscal 2017 VOICE results for diversity and mutual respect in the Asia Pacific region indicated that employees want more effective, open communications. The most common issue identified is that the efforts of management in the spirit of the OMRON Principles to incorporate diverse employee views and opinions is not being communicated to employees sufficiently. With employees working in nine countries throughout the Asia Pacific region, we came to believe that unconscious attitudes and behavior particular to each cultural background could negatively impact employee motivation and the workplace environment.
Therefore, OMRON implemented a training program emphasizing diversity and acceptance of all employees. We held this training twice in Singapore during fiscal 2018, attended by 43 senior managers. The training defined the concepts of workplace diversity, unconscious attitudes and behaviors, and micro behaviors (split-second behaviors demonstrating a person's emotions). Training delved deeper into examples of these behaviors, helping attendees reflect on their own stereotypes and unconscious attitudes. Finally, attendees discussed how these stereotypes and attitudes could hinder respect for diversity in the workplace and have a negative impact on business.
The scope of these training activities has been expanded to include employees. Here, participants are learning how to build workplace environments that are accepting of diversity. In fiscal 2019, we will accelerate Diversity & Inclusion through activities over wide OMRON.

The OMRON Global Awards (TOGA)

The circle of resonance that originates from TOGA now involves outside OMRON as well, and will certainly spur new "innovation driven by social needs." In this article, we highlight the TOGA story that began in 2012 and several presentations from the 2018 edition of TOGA.

TOGA Begins as the Passion of One Employee

The inspiration for TOGA began in the vision of Irawan Santoso, president of PT.OMRON MANUFACTURING OF INDONESIA (OMI), as a means to practice the OMRON Principles in our Indonesian production centers. Santoso's aspiration for the OMRON Principles ranged far beyond OMRON's manufacturing plants to include nearby factories and the Indonesian government in a program to employ disabled individuals. At the 2012 event to celebrate OMRON's founding, Santoso was recognized with the Special Challenge Award, citing his outstanding example of practicing the OMRON Principles. Said OMRON CEO Yoshihito Yamada, "I believe there are many more examples out there of employees putting the OMRON Principles into practice. We would like to uncover these current and future examples, sharing, supporting, and recognizing the efforts of OMRON employees." From this idea, TOGA was born.

Irawan Santoso Shakes Hands With CEO Yoshihito Yamada at the Beginning of the TOGA Global Meet (May 2019)

OMI President

Irawan Santoso

After being named president of OMI in 2007, I had the opportunity to visit OMRON TAIYO Co., Ltd. (Oita Prefecture, Japan), the world's first factory designed for the disabled. There, I saw disabled individuals working enthusiastically, maximizing their talents and expressing their individuality. These employees leveraged their respective strengths, complementing and compensating in areas where others may be weaker. Seeing the situation at OMRON TAIYO, I felt a strong desire to create the same type of workplace in Indonesia where all people could shine. After returning to Indonesia, we went about creating a rewarding workplace for both able-bodies and disabled individuals, going beyond our existing efforts already in place. After an extended period of effort, we created a program in 2010 to train and hire disabled persons. As a result, we doubled the hiring rate of the previous year, recruiting 30 individuals. I will continue to create rewarding environments for all people throughout the world.

Solving Social Issues Through Our Businesses
IoT-Based Waste Treatment Contributes to a Change in Environmental Awareness

Australian Subsidiary of the OMRON Industrial Automation Business
OMRON ELECTRONICS PTY. LTD.
Henry Zhou (right),
Milorad Srdic (left)

Insufficient landfill for waste and environmental pollution arising from toxic substances in landfills are a serious issue in Australia. In response, the Australian central government set a goal to significantly reduce landfill waste by the year 2030.
Wanting to help solve this social issue that will impact not only our own generation, but also that of our children, we included engineers from Singapore and Japan to develop a smart dumpster for commercial use. This smart dumpster uses a combination of IoT and Big Data technologies. Commercial-use smart dumpsters are large receptacles for collecting trash produced by businesses at shopping centers and other locations. These dumpsters consist of two separate sections, one for general waste that goes to landfills and one for recycling. To raise awareness of the environment among businesses, general waste is assessed a fee based on volume, while trash for recycling is free. These dumpsters offer benefits to collection companies as well. Dumpsters are outfitted with mechanisms to provide information about current status and collection timing via the internet. This system means more efficient collection truck operations, less road damage due to over-heavy collection trucks, and other optimized overall operating costs. To date, more than 200 smart dumpsters have been installed, with more installations every day. While this project was effort by the Industrial Automation Business to expand our range of businesses, we feel a sense of pride in contributing to the central government's goal of reducing landfill waste and in contributing to the creation of a more sustainable society. We will continue this initiative to provide a better society for our children.

Contributing to Healthy and Comfortable Lives
A Significant Reduction in Parts Supply Lead Time

Chinese Production Center for the OMRON Healthcare Business
OMRON DALIAN CO., LTD.
Li-Hua Tang

The Chinese market is experiencing rising demand for home-use medical equipment, as well as an explosion in the popularity of online shopping. The pressing need in response to these environmental changes is a platform for customers to purchase what they want, any time they want. The key word here is speed. As a manufacturer of OMRON home-use medical equipment, we at OMRON DALIAN decided that if we could increase production speed, we could deliver needed OMRON home-use medical equipment to all people when required. To achieve this vision, we set a goal to reduce lead time for parts supply to one-tenth of the current time required. Some voiced doubts at first, but people began to believe in my vision as Team OMRON came together to pursue this goal. We conducted a complete review of our parts suppliers and delivery routes, conducting simulation upon simulation. In the end, we consolidated parts to a single storage warehouse. We also revised how we opened parts packaging and packaging materials, continuing to try ideas never attempted before. Over three years since 2016, we finally reduced parts supply lead time to one-tenth of our original time. This initiative also resulted in lower inventory levels and logistics costs. Reduced delivery frequency also means reduced CO_2 emissions. These benefits have been a result of practicing the OMRON Principles. OMRON DALIAN will continue striving for all people to have ready access to the health equipment they want, contributing to healthy and comfortable lives.

Highlights of the TOGA Program

TOGA encourages employees to set their own goals to help them experience the connection between their work and the OMRON Principles. The aim of this initiative is to foster a culture of ongoing aspirations to put the OMRON Principles into practice. We share and publicly praise OMRON Principles practiced in everyday work and workplaces, expanding the circle of empathy and resonance in practicing the OMRON Principles.
The TOGA program is ongoing throughout the year. Thirteen teams that pass preliminary selections from our organizations around the world are invited to come to Kyoto to present their TOGA initiatives at the OMRON Global Meet. These teams bring back news of how other team initiatives were received to their local workplaces, sharing their experiences with their co-workers and expand the resonating circle throughout the world.

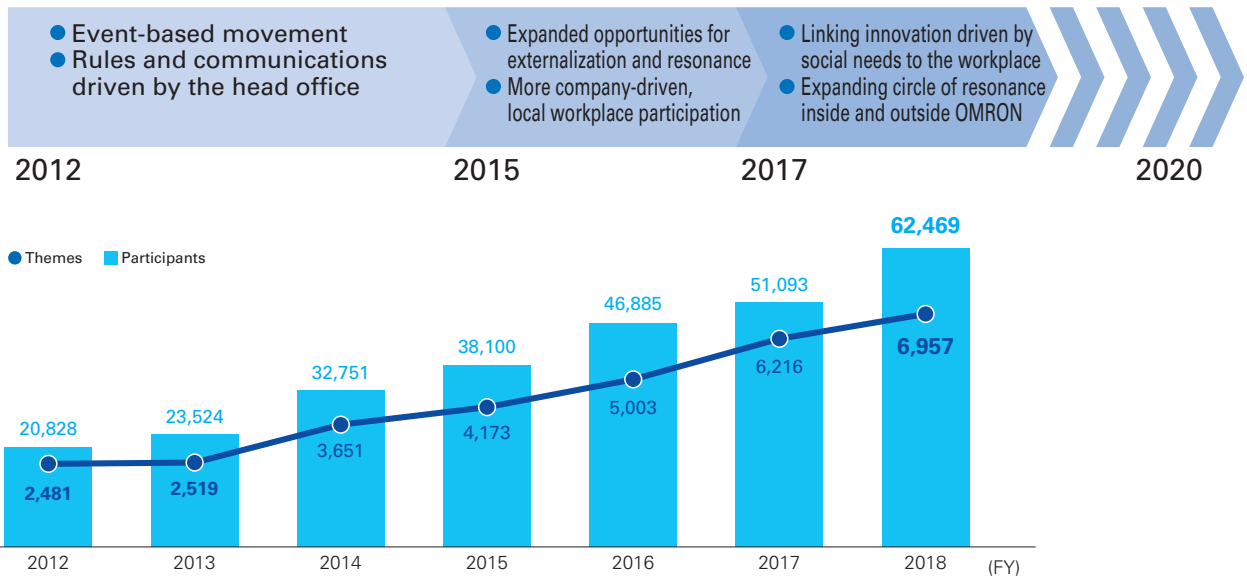
The TOGA Process

TOGA is designed based on the SECI* Model of knowledge management in which the tacit knowledge of an individual is drawn out to become shared knowledge throughout an organization. OMRON engages in a cycle of setting inspirational goals, taking action, and reviewing progress to share information and encourage buy-in throughout the entire year.

*SECI Model: A knowledge management mechanism produced by Hitotsubashi University professor Ikujiro Nonaka that focuses on knowledge creation activities. Through a conversion process of socialization, externalization, combination, and internalization, organizations can take the tacit knowledge of an individual and create shared knowledge throughout a group or organization. (Source: Globis University, Graduate School of Management MBA Glossary)

Seven Years of TOGA Evolution

In the seven years since its launch in fiscal 2012, TOGA has received entries a cumulative 31,000 entries from 275,000 people. This grassroots initiative to practice the OMRON Principles has taken root across the globe.
After OMRON revised the OMRON Principles in 2015, each company and division began conducting activities to clearly demonstrate the link between the principles and our business. As a result, TOGA projects have become more diversified, with more projects addressing innovation driven by social needs every year. The TOGA program itself has seen an evolution in the content of employee submissions. And the circle of resonance that originates from TOGA has expanded to include individuals even from outside OMRON.



To Become People Who Practice the OMRON Principles——— OMRON Employees Living the Values

To link practice of the OMRON Principles to personal action for each employee, we have defined 18 examples of living the values inspired by the OMRON Principles.

Innovation Driven by Social Needs

Be a pioneer in creating inspired solutions for the future.

[Living the Values]

- Look at society from a future-oriented perspective.
- Always think and act in pursuit of the true issue.
- Always remember that the customer is our focus
- Never be satisfied; never settle for the status quo.
- Make it Habit to ask "why?" and "for what reason?"
- Try new things and new ways that have never been tried before

Challenging Ourselves

Pursue new challenges with passion and courage.

[Living the Values]

- Use the 70:30 theory*; try, fix, and perfect.
- Enjoy challenges.
- Use failure as fuel for success.
- Declare and pursue higher goals.
- Have an unshakeable faith in yourself; have the strength of conviction.
- Don't wait to be told; take the initiative and take action.

*The 70:30 Theory: An idea with a 70% change of success is worth trying. But, have preparations in place for the 30% change of failure.

Respect for All

Act with integrity and encourage everyone's potential.

[Living the Values]

- We exercise responsibility and good sense in obeying the law and the rules of society.
- We act with integrity at all times, no matter what the business environment.
- We realize that we are a member of society, and we endeavor to act with consideration and empathy to others.
- Don't give up before trying; believe that you can succeed.
- Believe in the capabilities of your team members; support each other and work for growth.
- Accept those who have different views & values; use these differences to create new value.

Environment

Corresponding SDGs

Building an environment for a sustainable society is part of improving lives and contributing to a better society, as stated in the OMRON Principles. In support of this ideal, we pursue initiatives under our Green OMRON 2020 environmental vision. Green OMRON 2020 sets six environmental targets as goals for 2020. Of these goals, Reductions of Greenhouse Gas Emissions and Appropriate Management and Reduction of the use of Hazardous Substances were two on which we focused in 2017 as important company-wide sustainability initiatives.

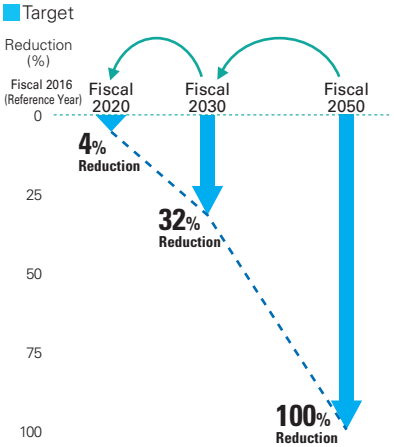
Initiatives to Achieve OMRON Carbon Zero, Aiming for Zero Greenhouse Gas Emissions by Fiscal 2050

In July 2018, OMRON set OMRON Carbon Zero as a new target aiming for zero greenhouse gas emissions by fiscal 2050. In line with this initiative and in response to climate change and global warming, we changed our greenhouse gas emissions indicator from net sales to CO_2 emissions to total emissions. Using 2016 greenhouse gas emissions quantities as a baseline, we backcast from 2050 to develop targets for 2030 and 2020.

Fiscal 2018 results:

Created an action plan towards the 2020 4% reduction targets (energy savings, introduction and purchase of renewable energy), achieving fiscal 2018 reductions of 21,000 t-CO_2 (baseline: 2016) ahead of schedule.

Greenhouse Gas Emissions Reduction Targets



At OMRON, 90% of our greenhouse gas emissions are from our electricity usage. Therefore, our efforts regarding electricity usage are a priority issue. To this end, our basic policy is to minimize the amount of electricity used within OMRON and use renewable energy for business activities that contribute to corporate growth and reduced greenhouse gas emissions.

In fiscal 2018, we reviewed electricity procurement methods for approximately 40% of OMRON's electricity consumption in Japan. We began procuring electricity from renewable sources in the Kansai area of Japan in December 2018 and in June 2019 for the Kanto area of Japan.

In the future, we will expand these initiatives to Asia and other regions, looking towards zero greenhouse gas emissions by 2050.

The OMRON Principles are the foundation of everything we do. OMRON Corporate motto is to improve lives and contribute to a better society. In terms of the environment, this means using our business activities to reduce environmental impact and increase our contribution to the environment, helping others live a secure and comfortable life in a true sustainable society. We believe our mission is to pass on a better society to future generations. In pursuit of this mission, we promote environmental activities as part of our day-to-day practice of the OMRON Principles.

Global Manufacturing Innovation HQ, **Teruyasu Imai**

Initiatives to Reduce Greenhouse Gas Emissions

OMRON's environmental actions for reducing greenhouse gas emissions are twofold. First, reduce the environmental impact through our business activities and second, contribute to the environment by providing society with valuable products and services. One example of reducing the environmental burden through our business activities is promoting energy-savings by visualizing energy consumption in our facilities. This includes air conditioning and lighting on factory product floors and providing optimum control of this equipment in line with production status. We are also installing solar power facilities in our buildings. Examples of reducing our environmental burden through our business is our power conditioners, used for solar power generation, and storage batteries. These products facilitate the efficient use of generated electricity (measured as *environmental contribution*). At the same time, our products provide energy systems and services for local production and consumption linked to regional revitalization.

Make Maximum Use of All Management Resources

Offer Products and Services Useful to Society

Adopted system to visualize electricity usage (Ayabe City, Kyoto)

Converted self-generated power to clean energy (Production plant in Guangzhou City, China)

Products that contribute to the spread of clean energy

Used abandoned fields to create locally produced, locally consumed energy (Miyazu City, Kyoto)

Support for TCFD

TCFD TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

OMRON recognizes that climate change impacts our future sustainable growth. We are engaged in the following framework, using the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD), for which we declared our support in February 2019.

Category	OMRON Initiatives
Governance	● Incorporate climate change issues into governance and management systems for sustainability initiatives and goals ● Link overall sustainability, including climate change, to executive medium- and long-term performance-linked compensation (internal directors, executive officers)
Strategy	● Risk: Started study of increased business costs due to higher energy costs, capital investment in renewable energy/energy-saving facilities, and the impact of carbon tax, etc. (migration risk) and support for business continuity in our own company and supply chain associated with flood damage or similar (physical risk). ● Opportunity: Increased environmental contribution from our business through products and services; also, we can expect more opportunities from environmental business and in environment-related service and maintenance businesses
Risk Management	● Collect and analyze a wide range of information on risk factors including regulations and impact on business ● Understand the vulnerability of production centers to natural disasters (flooding, torrential rain, water shortages, etc.) which are expected to increase in scale and frequency as a result of climate change; make preparations for business continuity
Indicators and Targets	● Set targets aimed at achieving Carbon Zero (Scope 1 and 2) by fiscal 2050 (Revised to 1.5C target to match SBT* accepted norms) ● Target for Scope 3 also being considered

*SBT: Science Based Targets. Science-based, medium- to long-term targets for reducing greenhouse gases.

Risk Management

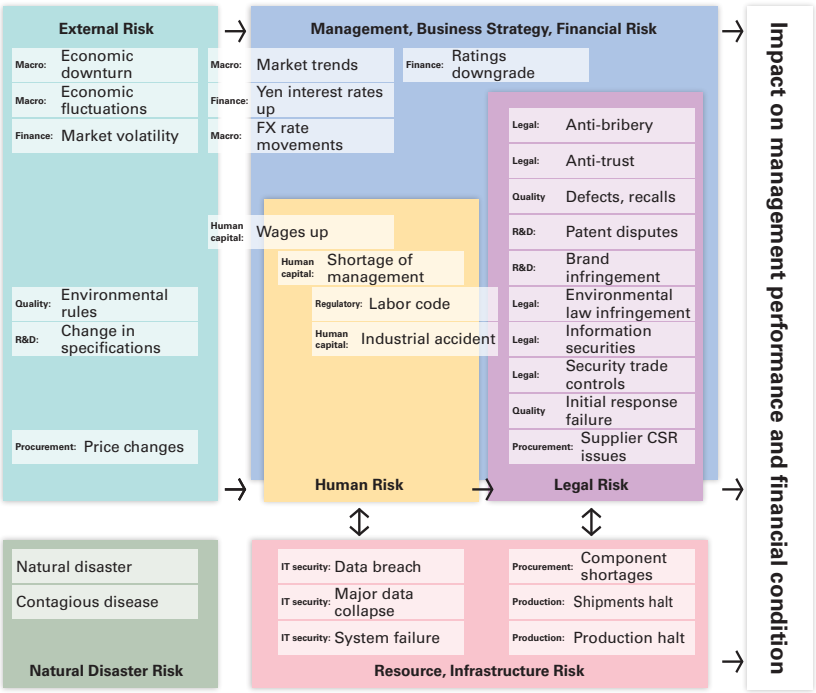
Corresponding SDGs

Integrated Risk Management Supporting Global Business Activities

At the same time we began executing VG2020, we also launched our existing integrated risk management program. Our risk management platform reflects the sentiment of top management that the faster pace of change in the operating environment and rising levels of uncertainty calls for preparation and rapid response to risk. Management felt the need for OMRON to become more attuned to risk, addressing risks at the earliest stages.

OMRON must deal with a variety of risks as we continue to expand our businesses globally. In response, we have categorized the entire spectrum of risks that impact management performance and financial health. Having categorized these risks, we then chart their interrelationships. We use this framework as a link between management and the local workplace, helping management work with local staff to engage in risk management that resolves issues that must be dealt with at levels above the local workplace. VG2.0 includes measures related to business risk management that supports innovative creation.

Businesses and Risk*



*Graphic representation of the business risks as shown on https://www.omron.co.jp/ir/keiei/risk.html

Integrated Risk Management Structure

OMRON has established PDCA activities that are conducted throughout the year to analyze risks, respond to critical risks, and engage in crisis management. For example, we summarize and share past examples of risk internally throughout the group. We formalize this shared framework into a document titled *OMRON Group Rules Based on the OMRON Principles*. This document clarifies the role of risk management in OMRON Group management.

Activity Cycle for Integrated Risk Management

Corporate Ethics & Risk Management Committee
- Determine risk response plan for the upcoming year
- Determine budgets for the upcoming year

Execute Plan
- Share and report information related to important risks
- Conduct activities based on the plan
- Corporate ethics month

Board of Directors
- Annual activity review

Executive Council
- Report the progress of activities for the current year
- Report results of global risk analysis
- Determine important Group risks for the upcoming year

Analyze Global Risk
- Headquarters, regional headquarters, divisions

Corporate Ethics & Risk Management Committee
- Annual activity review
- Share analysis of risks
- Select important Group risks (draft)

Disclose Results of Activities

Initiatives to Strengthen Compliance Through Instilling Ethics Rules

One example of living the values in the OMRON Principles is to exercise responsibility and good sense in obeying the law and the rules of society. In fiscal 2016, we began a global expansion of Corporate Ethics Month activities from Japan to encourage all employees to put this action into practice.
The OMRON Corporate Ethics Month serves as an opportunity to take a fresh look at whether our business initiatives are honest with society from a perspective of compliance with laws and rules, returning back to the origins of the OMRON Principles. We have designated October every year as our Corporate Ethics Month. During the month, we provide opportunities to instill ethics in our employees and conduct ethics training.
To expand these activities globally, we have asked staff responsible for risk management from every division across the world to serve as core members in discussing best methods for our activities to take root globally. As a result, we have decided to engage shared group initiatives based on the OMRON Principles. We will also add initiatives customized to the laws, customs, and other attributes in regions on the forefront of our businesses. In fiscal 2018, in addition to translating CEO Yoshihito Yamada's message into 25 languages for distribution to all global employees, we also put independent rules for ethical conduct in place in each region. One example is our response to the EU General Data Protection Regulation, which significantly strengthens personal information protection. Here, we have gone to great lengths to make this issue more familiar to our employees, providing information about the new rules as we tailor our response to meet the issues of the times.
By sponsoring these types of initiatives to raise awareness of ethics, we achieved a 77 percent positive response related to Practicing Ethics and Honesty in our fiscal 2018 VOICE engagement survey. The third-party entity conducting the survey for use indicated that this was a very healthy situation for a company. P61 Human Resources Management

In the Asia Pacific area, OMRON held an event to raise ethics awareness among all employees. The event encouraged employees to wear green, representing growth, harmony, safety, and the environment.

In EU area,instilling Corporate Ethics at OMRON Through Educational Posters, E-Learning Training

Whistleblowing System Available to Employees and Families

OMRON has established the OMRON Group Rules for Ethical Conduct, which provides for respect for human rights through our organization and employees, creating a workplace respectful of labor standards, prohibiting private actions that may harm the safety of OMRON products and services or the OMRON brand, and more. We have created a Whistleblowing System (internal reporting and consultation desk) for use in the event of violations or potential violations of rules, helping the company quickly identify and resolve such issues. Since establishing the system in Japan in 2003, we have expanded the system globally in formats tailored to each region. We have set up liaison desks both inside and outside the company. Our internal desk is staffed by local legal affairs departments, while our external desk is overseen by specialist organizations and attorneys. These desks are available not only to full-time OMRON employees, but also to contract employees, part-time employees, temporary staff, and families, including those at OMRON affiliate companies. Internal rules require strict confidentiality and prohibit retaliatory action. Further, we publicize this system through bulletin boards, internal training, and other means. In fiscal 2018, OMRON received 83 notifications and requests for advice.

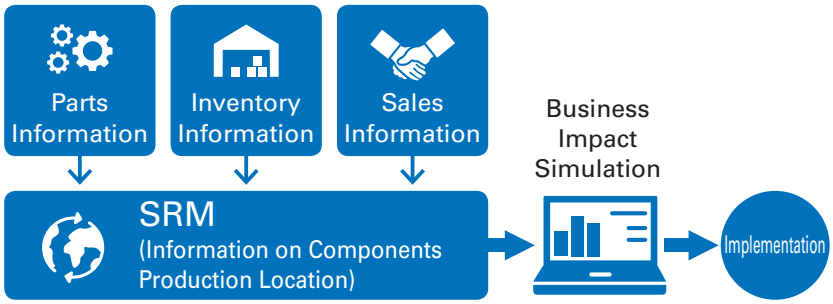
Responding to Natural Disasters

Corresponding SDGs

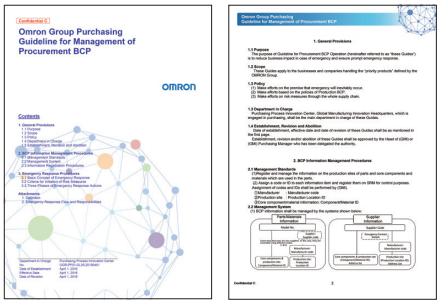
During fiscal 2018, major earthquakes in northern Osaka, Hokkaido, Indonesia, and Mexico, as well as heavy rain and large typhoons in western Japan, were natural disasters with the potential to threaten the continuity of OMRON businesses.
Since the March 2011 Great East Japan Earthquake, OMRON has been working to fulfill our supply and business continuity social responsibilities. We have also strengthened our response to risks such as natural disasters, which we can only expect to increase.

Stronger Procurement BCP Via Supplier and Risk Management Systems

As a manufacturer, we believe in the importance of fulfilling our supply responsibilities and thereby raising our corporate value. As part of our efforts to minimize the impact of natural disasters on customers and our own business, we took the lessons learned from the Great East Japan Earthquake, and in 2012 implemented the OMRON Supplier and Risk Management System (SRM), a countermeasure against procurement risk. SRM is an application software installed on enterprise systems to manage the location and parts manufacturing information related to global suppliers.
During the Great East Japan Earthquake, many suppliers of semiconductors and electronic components in the Tohoku region suffered damages that had an extensive impact on our components procurement network. We spent more than one month in understanding and identifying parts and production information, leading to an extended period of uncertainty about production recovery.
We built SRM as a response to the lessons learned at that time. In the wake of the Kumamoto earthquakes in 2016, we created guidelines for procurement BCP operations, while continuing to refine both operations and systems.
Today, we can use information obtained via SRM during a disaster to identify components produced by suppliers in the area and products made from said components. This information allows us to conduct simulations and assess the impact on our business within 24 hours.
The OMRON SRM and procurement BCP showed its effectiveness during the 2018 Mexico earthquake, the northern Osaka earthquake, and the heavy rains in western Japan. We identified the situation at our suppliers and managed components quickly, meeting our responsibilities for procurement and supply as a manufacturer.



Simulations of the business impact using parts, inventory, and sales data based on production location information for components registered in SRM



Shared Global Operating Guidelines (Published in 2016)

OMRON engages in Procurement BCP not because of the potential for disaster, but with the knowledge that disasters will happen. Based on this stance we engage in measures to collect information constantly and to mitigate risks. Information accuracy is important for making a prompt response to emergencies. With the cooperation of our suppliers, we use an interactive system to secure information in a timely manner. Even during disasters, OMRON contributes to a sustainable society by meeting our responsibilities to supply our customers.

Global Manufacturing Innovation HQ **Kumiko Ueno**

BCP Training for Stronger Disaster Management

Training at a Production Center for Electronic and Mechanical Components Business (December 2017)

Since the Great East Japan Earthquake, OMRON has focused on disaster-response measures, as well as related training and education in every global location. Our efforts here are to prevent or mitigate human and property damage through prompt, correct initial response in the event of a disaster. We believe that we can only respond to a disaster to the extent that we have prepared. Therefore, we conduct drills in each location around the world, assuming the type of disaster that may occur, aiming to improve employee awareness of disaster and disaster-response capabilities.

In addition to initial response training, evacuation training, safety confirmation training, and other training for all employees, OMRON has been engaged in business continuity planning (BCP) training since 2012, mainly in Japan, which has a propensity for natural disasters such as earthquakes and typhoons. Our preparation proved itself in the Kumamoto earthquake of April 2016. While OMRON facilities in Kumamoto and Oita suffered damage, we incurred no major interruptions to production. OMRON RELAY & DEVICES Corporation, a production center for electronic components, quickly confirmed the safety of employees and production quality. In fact, OMRON RELAY & DEVICES was one of the earliest companies in Kumamoto to return to regular production. This outstanding performance was the result of regular disaster preparedness training, as well as BCP training conducted in 2014 in anticipation of earthquakes.

To incorporate the experience and expertise cultivated through these Japanese-based training programs throughout the entire OMRON Group, we began rolling out BCP training globally in fiscal 2016. In fiscal 2018, we conducted training in 15 locations, mainly in Asia, China, and Japan, which represent the bulk of our production centers. In BCP training, senior management and crisis-management personnel at each site create scenarios based on the experience and perspective of OMRON in past disasters. Responses are formulated based on these projected scenarios. This type of training allows OMRON to improve our ability to predict situations, share awareness of disaster-preparedness among member companies, and minimize the impact of disasters on our business.

Disaster-response and BCP training raise employee awareness of prevention. At the same time, we focus on knowledge management to ensure training and experience from disasters become knowledge assets. Our ongoing efforts will lead directly to employee safety, to meeting our supply responsibility, and to ensuring OMRON business continuity.

OMRON takes measures to prevent indirect risk, direct risk, and to prevent damages to our business and our employees. We also employ safety measures to protect against the event of risk and damage. I have a personal desire to support OMRON Group businesses by going out into the field to work with local workplaces to engage in day-to-day safety measures for the employees who work at OMRON. Through local experience and sharing what I learn with the rest of the OMRON Group, I help protect the safety of our employees and contribute to the further development of our business.

OMRON EXPERTLINK Co., Ltd. **Masanori Kushida**