Message from the CTO

Creating New Business Quickly by Visualizing the Process of Innovation and Discussion

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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

How will we achieve innovation in an age of VUCA?

—— In your position as CTO, what impact do you think that the spread of COVID-19 across the world has had on OMRON?

The current era was already being described as an age of VUCA (Volatility, Uncertainty, Complexity, and Ambiguity), and this pandemic has impressed on us the undeniable reality of that view. Precisely because the world is now so uncertain and unpredictable, we will no longer be able to compete using the methods we have used in the past.

We must have multiple options at all times in preparation for an ever-changing future.

OMRON has been taking a backcasting approach to the creation of new business, starting from specific points in the near future ranging from three to ten years from now. One example is the Innovation Exploring Initiative HQ (IXI), a company-wide platform established in 2018 to create innovation with near future design. Over the past two years, IXI has been developing various near-future scenarios and exploring business models necessary for the realization of those scenarios. Testing these scenarios and models with a trial-and-error approach, occasionally pivoting (deliberating from various angles) along the way, this HQ has been exploring the sprouts of new business. Facing the COVID-19 pandemic convinced us that we had not been wrong in adopting such an approach. In the age of VUCA, it is essential for OMRON's growth that, as we move toward the future, we have various options running concurrently.

——There is an established theory that holds that large companies are slow to generate innovation. Since its foundation, OMRON has realized innovation through the encouragement of venture spirit. What has IXI achieved over the past two years?

To acquire the capacity for self-driven growth, we are working on "ambidexterity in management," by which I mean development for the deepening of existing businesses and exploring new business models for the future. IXI's role in this process is the exploration of new business models for the future.

For the past two years since 2018, an enormous number of ideas have come in from across the OMRON group. From those many ideas, six projects are currently in the business verification stage. They include a project under a partnership agreement with Oita Prefecture to provide long-term care prevention services for the elderly, as

well as an agri-automation project in China. Although these projects are all in different sectors, they have one thing in common, namely, they are all data-driven businesses. In other words, leveraging sensing technologies, one of the OMRON's core technologies, to collect various data and connecting that data to true social needs is giving rise to new business opportunities.

—— Is this not something that the existing business units could achieve themselves?

In this age of VUCA in which we find ourselves, it is not realistic to take action based on only one scenario. To respond to a changing future, we need to have multiple scenarios at hand and keep repeating the cycle of validation and pivoting. That takes time and effort, and, inevitably, efficiency declines will ensue. That kind of redundancy is not something that can be tolerated in our existing business units, which have budget responsibilities. For this reason, it is the role of IXI to explore new social needs and commercialize those needs, things that cannot be achieved within frameworks of our existing businesses.

Knowledge Management Essential for the Creation of New Business

—— Conversely, have other issues emerged?

One issue that emerged was the inability as an organization to build a mechanism for "knowledge management" to accompany the exploration of new social needs and the commercialization of those needs.

In particular, we focused on the judgement of business ideas that provide the starting point for projects. The key here was whether we have the perceptive capacity to seek out true social needs. At first glance, we can discover several business ideas that would appear to incorporate social needs, but if our discernment of those needs is lacking and they end up falling into the category of individual needs, even if they are commercialized, the business could not be scaled up. If we were to merely expand the individual needs of specific customers to some extent, we could only expect sales in the order of around ¥1 billion at most. At OMRON, we have set the hurdle (minimum criterion) for new business at ¥3 billion in sales, so unless a business model addresses true social needs, we will not be able to launch it as a new business.

In the process toward commercialization after selection of the business ideas, in more than a few cases, the project relied on the individual efforts of particular team members. In other cases, the project lost speed as it headed toward launch because of a lack of driving force caused by insufficient leadership from management.

Based on these reflections, with the aim of not only creating new businesses but also sharing and utilizing knowledge to increase the certainty of such businesses, we established a mechanism we call the Integrated Innovation Process, which combines both processes (refer to the diagram on the next page). This mechanism consists of four phases: Phase 0—Business Idea Selection, Phase 1—Strategy Formulation, Phase 2—Business Verification & Technology Validation, and Phase 3—Business Development, where investment comes in. Key checkpoints have also been set between Phase 0 and Phase 1 and between Phase 2 and Phase 3. The former is the Business Idea Judgement Meeting, and the latter is the Investment Committee.

At the initial stage of Phase 0, we put out a call for business ideas. All employees are welcome to raise their hands, and in fact, we receive ideas from all divisions across the OMRON group. However, as I mentioned earlier, the key is to have the perceptive capacity needed to seek out true social needs. At this stage, a judgement of whether or not the business has scaling-up potential is required. The first checkpoint, the Business Idea Judgement Meeting, plays that important role. IXI and the Technology & Intellectual Property HQ, which is responsible for R&D, have each been assigned one employee with extensive business experience both inside and outside OMRON and a particularly discerning eye regarding the keys to the success or failure of new businesses. They assess the proposed business ideas with both the perceptive capacity to determine whether or not the ideas can respond to true social needs and a commercial sense to decide whether the ideas have scaling-up potential as businesses.

One of the most amazing things about Kazuma Tateishi, the founder of OMRON, was that he not only focused on true social needs and developed products that did not yet exist at the time, such as automated ticket vending machines and home healthcare equipment, but he also leveraged his commercial sense to grow them into OMRON's

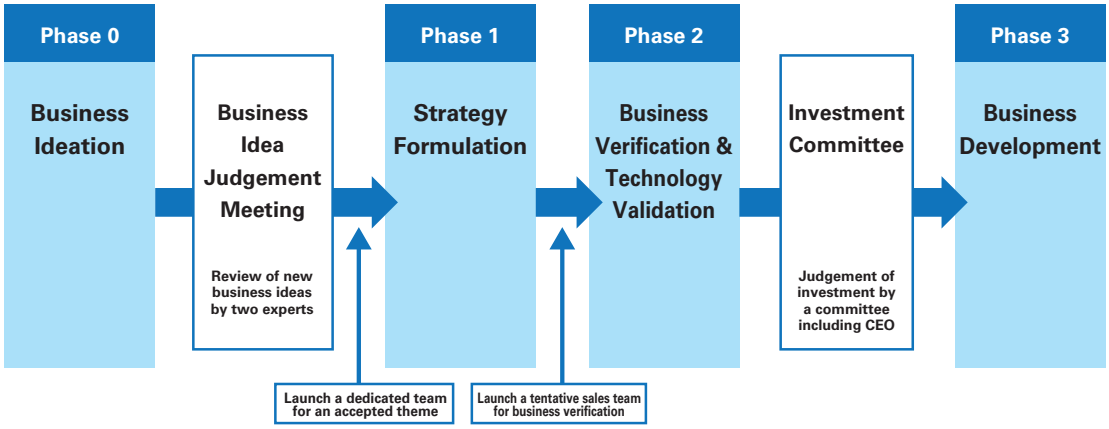
main businesses of today. This Integrated Innovation Process came about by visualizing those methodologies of the founder and arranging them into a more contemporary format. It could be described as an innovation compass befitting the age of VUCA.
The Integrated Innovation Process is a tool that not only points us in the direction we need to go, but also identifies what stage a project is at and what decisions need to be made. For example, suppose a certain project has hit a wall. In this case, the business idea's premises may be wrong or some important factor may be lacking from the strategy. If that is the case, we need to go back to the appropriate phase and re-examine the premise or strategy.
In order to evaluate them objectively and quickly, it is important to visualize the current status and progress of project. The Integrated Innovation Process allows all members of IXI and the Technology & Intellectual Property HQ to review the status of each project online. Discussion is also held openly, with more than 100 members voluntarily participating in each discussion.
The reason for my insistence on this kind of mechanism of open knowledge management is that innovation attempts have a tendency to become personal. If we cannot visualize the process, there is a possibility that individuals could take over the whole project or, conversely, due to an inability to obtain cooperation from those around them, an excessive burden could be placed on the people in charge of a project, causing it to collapse. Also, if we do not accumulate the knowledge obtained through the process at the appropriate strategic points, we will not be able to learn from past mistakes next time. To ensure that innovation does not become a mere product of chance, we need to accumulate and share knowledge as an organization and increase the speed and accuracy of new business creation.
As evidenced by the many companies that fall into a dilemma, innovation is not a straightforward task. We must nurture the buds of opportunities while responding flexibly to unforeseen circumstances. However, time waits for no man. The most important thing we should do is to speed up. The Integrated Innovation Process is not a rubber-stamping process by any means, but a mechanism to accelerate innovation.

Advancing Projects Through Repeated Cycle of Strategy Formulation and Verification

—— Could you give us a more detailed explanation of the process by which ideas advance to commercialization?

For example, suppose we have a theme of "remote medical consultation service" in Phase 0. At the starting point, OMRON does not need to be the subject in this context. We begin by drawing a picture of the future from the perspective of who will dominate the world of remote consultation service. Once that picture has been envisaged, we start discussing what kinds of business OMRON could develop in that space and what scale we could expect that business to achieve. In other words, in Phase 0, we draw up the big picture of the project.

Integrated Innovation Process



Then, at the first checkpoint, the Business Idea Judgement Meeting, the business potential of the project will be assessed from the perspectives of perception of social needs and scaling-up potential. Once the go-ahead is given at the Business Idea Judgement Meeting, a project team will be formed to start the strategy formulation process in Phase 1. The team will envisage issues such as deregulation and advances in medical technology that would be needed for remote consultation services, as well as the strategies of our competitors. It will then come up with concrete visions for products and services that would leverage OMRON's strengths.
Next, in Phase 2, a virtual sales force (a team that will not be given a sales quota but that will work on the ground to test whether or not the envisaged products and services would sell) will be launched and the process of business verification will commence. Concurrently with that process, the technology needed for those products and services will also be validated. For both business and technology models, if a gap emerges between strategy and reality, the teams will pivot as many times as necessary. Depending on cases, they go back to the previous phase to rework the theme or strategy.
After that process of formulation and verification has been repeated several times and prospects for commercialization have emerged, the project will then be put to the second checkpoint, the Investment Committee. This Committee will assess the project from comprehensive perspectives, including business scale, concrete strategies, and feasibility, and determine whether the project should proceed to Phase 3 for full-scale business development.
As I mentioned earlier, there are six projects in progress and one of those is an agri-automation project in China which is now proceeded to this Phase 3. In March 2020, we established a new company, OMRON Smart Agri Technologies Co., Ltd. in Shanghai, where we have embarked on the final step of validating and evaluating the project's business potential in China, while assessing the status of fresh food distribution in China.

—— At which phase does President and CEO Yamada join the process?

CEO joins the process from the Investment Committee, just before Phase 3. When he takes part, one thing that CEO Yamada always asks about is "exit criteria." We need to show him specific criteria, using concrete numbers such as "unless we achieve at least XXX yen in sales or a market share of at least XX% within X years, we will withdraw from the project." I also commit to those criteria. It may be a new business, but a certain level of discipline is essential.

——This approach of repeated trial and error is sure to nurture your personnel, isn't it?

Exactly. Looking back over the past two years in IXI, all of the team members who have been involved in the project have learned tremendous lessons by experiencing a variety of trial-and-error processes, and they have definitely experienced growth. In that respect, this innovation creation process can also be described as a human resource development process. The process is actually an innovation itself.
Having said that, creating new business with ¥3 billion or more in sales is certainly no easy task. Therefore, the project team members need to have the perceptive capacity to discern true needs and the commercial sense to scale businesses up, as well as a strong will to succeed in business, whatever it takes. OMRON needs more people like this, who are brimming with an entrepreneurial spirit
Another important point is the commitment of management. Management must be prepared to work together with front-line staff and not foist the creation of new business entirely onto them. Unlike business organizations that have a vertical structure, an innovative organization should be a flat and open network structure. Therefore, we need to approach the creation of new business as a company-wide battle.
Armed with our new weapon of the Integrated Innovation Process which combine the wisdom from across the OMRON group, even we fail, we will turn them to good account. Never giving up, we will boldly meet the challenge of innovation in the age of VUCA, with our venture spirit.

OMRON VENTURES CO., LTD.
President and CEO
Tomoko Inoue

OMRON VENTURES strives to create a new world by joining hands with entrepreneurs who seriously believe they can change the world.

OMRON believes that, to solve social issues that are becoming increasingly serious and diverse, it is important to create new business and strengthen existing businesses through open innovation that is not constrained by conventional frameworks. For this reason, in July 2014, we established our own corporate venture capital (CVC) to use investment as a means of deepening collaboration with startup companies that have creative technologies and ideas but we didn't have connections with before. That CVC is OMRON VENTURES CO., LTD (OVC).
In the six years since its establishment, OVC has invested in 15 startups. One of its earliest investments was in an agriculture-related startup, Organic nico Co., Ltd. This company's business idea and technology are currently being put to use in an agri-automation project in China, leading to the creation of a new business for OMRON.

To Collect the World's Cutting-edge Technologies

I became OVC's second President and CEO in April 2018. Under the VG2.0 Medium-Term Management Plan that began in 2017, we designated certain focus domains, including factory automation, healthcare, and social solutions and determined to accelerate innovation driven by social needs and sow the seeds for future growth through open innovation.
To achieve this, it is more important than ever that we cast our antenna across the world and continue to identify trends of cutting-edge technology and businesses that have yet to sprout. Accordingly, in 2018, OVC made a significant change to its investment strategy. Until then, our investments had concentrated mainly on Japan, putting small amounts into startups with which our business divisions could collaborate in some way from the time of the investment. In a shift from that strategy, we decided to invest reasonably large amounts in early-stage startups that included seeds, in regions such as the United States, Europe, and Israel, where the world's cutting-edge technologies and business ideas are concentrated.
Since changing our investment strategy in 2018, we have invested in 7 startup companies in the United States, Israel, and the United Kingdom. All of these companies have unique technologies and ideas.
For example, Realtime Robotics, Inc. (United States), in which we invested in October 2019, is developing technology for real-time motion planning of industrial robots. This technology can significantly reduce the time needed to program robots' movements to avoid collisions with various obstacles, which currently takes hundreds of hours. If this technology is commercialized, there is potential for an immediate expansion in the adoption of robots. The validation of the technology is currently in progress at multiple factories. In the healthcare field, we invested in AIRx Health Inc. in the Silicon Valley in March 2020. This company is developing a unique business model for remote patient monitoring in the United States. Telehealth has attracted much attention during the COVID-19 pandemic, but it is something that patients,

doctors, and hospitals had been calling for even before the pandemic. This company's business model has the potential to change the future of healthcare.
In medical equipment in particular, it is extremely difficult for a single startup to handle the entire business from development to sales. With a system in which new technology developed by a startup can be connected to actual healthcare settings, after which a large, established company would be responsible for the scaling up of the technology, we will see the spread of the kinds of products and services that society really needs. It is my belief that it is precisely because corporate venture capital like OVC exists that innovation is generated and that more people are able to enjoy the benefits of that innovation.

Never Slow Down on Investments in Startups that Are Growing in Importance

As we have come through the COVID-19 pandemic, social issues that, until now, OMRON has identified through backcasting, have become more and more apparent. In particular, the need for labor-saving with the use of robots and remote patient monitoring is likely to accelerate.
I want us to create a new world by joining hands with entrepreneurs all over the globe who see things in their own freeway, who are unencumbered by conventional practice, and who seriously believe they can change the world. In particular, in today's society that is overflowing with data, we aim to create new value by leveraging the data as an asset, to realize a world that is free from disease, a world where humans and machines work together in harmony, a world that enables optimization of an autonomous individual simultaneously with optimization of the whole.
To this end, OVC will not slow down in its investment in the seeds of OMRON's future growth and continue to invest in aggressive startups.

OVC Investment Track Record

May 2015	Plant Life Systems Co., Ltd. (Japan: cultivation support systems)
Jun. 2015	3D Media Co., Ltd. (Japan: 3D recognition technology) In 2018, the company's name was changed to Kyoto Robotics Corporation.
Jul. 2015	Organic nico Co., Ltd. (Japan: production technology for organic vegetables)
Mar. 2016	Life Robotics Inc., (Japan: collaborative robot)
Oct. 2016	Exvision Corporation (Japan: high-speed vision technology)
May 2017	Vegitalia Inc. (Japan: agricultural IoT business)
Jun. 2017	Lark Technologies Inc. (United States: Health management applications for improving lifestyle habits)
Dec. 2017	mofiria Corporation (Japan: biometrics business)
Oct. 2018	De-Identification Ltd. (D-ID) (Israel: privacy protection technology for facial images)
Nov. 2018	Connected Signals, Inc. (United States: real-time, predictive traffic signal algorithms and data for vehicle use)
May 2019	Theranica Bio-Electronics Ltd. (Israel: advanced electrical neuromodulation devices for the acute treatment of migraine)
Jun. 2019	Patients Know Best Limited (UK: Health data sharing system)
Oct. 2019	Realtime Robotics, Inc. (United States: Real-time motion planning technology for industrial robots)
Mar. 2020	Avails Medical, Inc. (United States: Devices for use in antibiotic susceptibility testing)
Mar. 2020	AIRx Health Inc. (United States: Remote patient monitoring)

interview

Peter Howard
CEO, Realtime Robotics, Inc.

Realtime Robotics, Inc. aims to become the cornerstone of a wave of robotics automation by providing innovative technologies that will become the "common core" that will dramatically simplify robotics application and reduce their costs. OMRON is one of the world's top automation companies and has wonderful product lines that complement our products and vision.
OMRON VENTURES CO., LTD. has a good understanding of our value proposition and provides the support that will allow us to build the appropriate connections that we need in OMRON. Going forward, we will continue to work closely with OMRON VENTURES to realize our vision.

Vijay Rajasekhar
CEO, AIRx Health Inc.

AIRx Health Inc. is creating a scalable measure for health teams to triage (prioritize according to risk) and manage the health status of high-risk patients, including those with chronic diseases and novel coronavirus infections. By linking OMRON's medical devices with AIRx Health's software and remote consultation platforms, medical teams can dramatically improve medical outcomes with remote patient monitoring (RPM). We were impressed by OMRON VENTURES' enthusiasm and the speed of their decision making, which is on a par with that of prominent venture capital firms in Silicon Valley. We look forward to working with OMRON VENTURES to realize our common vision of improving the health of our several millions of patients around the world.

Strengthening Technology Management

To enhance its ability to bring innovation driven by social needs, OMRON has been engaged in strengthening core technologies, accelerating innovation, and strengthening intellectual property. This section highlights some of the progress made in fiscal 2019.

Strengthening Core Technologies

In fiscal 2019, we worked on creating new technologies, acquiring cutting-edge technologies through the corporate venture capital OVC, and implementing cutting-edge technologies in society through our business activities.

Creating new technologies

OMRON developed the decentralized learning technology Decentralized X that enhances the performance of artificial intelligence (AI) by integrating multiple machine learning models rather than aggregating field data in one place (November 2019)

Acquiring cutting-edge technologies through OVC P57

Implementing cutting-edge technologies in society through our business activities

- Industrial Automation Business: Launched the industry's first image processing system with defect extraction AI, which reproduces human sensibility and expert experience (June 2020)
- Social Systems, Solutions and Service Business: Initiated demonstration trials of a station guidance robot featuring voice-interactive AI engine that supports four languages (Japanese, English, Chinese, and Korean) (September 2019)
- Healthcare Business: Launched the world's first blood pressure monitor with an electrocardiograph (ECG) that enables users to monitor ECG data easily at home in the United States (May 2019)

Accelerating Innovation

IXI has been exploring new business models and is working on six business verification and development projects as of July 2020.

Major commercialization verification projects

- Project under a partnership agreement with Oita Prefecture to provide long-term care prevention services for the elderly (business verification phase)
- Organic tomato agri-automation project in China (business development phase)

Strengthening Intellectual Property

OMRON has been engaged in intellectual property activities based on its business, technology, and intellectual property strategies. In fiscal 2019, we continued to work on "Patent Dojo" and Invention Reward System to enhance the ability of our engineers to apply for patents. These efforts have led to an increase in the number of patents held by OMRON and recognition from external organizations.

Number of patents held

- 10,087 (increased by 305 from the previous fiscal year)

External recognition

- OMRON was selected for the fourth consecutive year as a Top 100 Global Innovator, an award recognizing the best 100 innovative companies and research institutes
- OMRON ranked 1st for the number of national patent applications for technology using AI in production plant management (survey by NeoTechnology, Inc.)

Example of Accelerating Innovation: Agri-automation Project

In recent years, China has seen rising health awareness and changes in food preferences. This resulted in a rapid increase in demand for fresh and delicious raw vegetables that are safe to eat. Organic or low-pesticide cultivation in a greenhouse is the best way of producing vegetables that are delicious and safe. However, this requires advanced farming skills and experience, such as careful temperature and humidity control, and measures against diseases and pests.

OMRON has developed an Agricultural Cultivation Support Service that uses information and communication technology (ICT) to visualize data on the growth of vegetables and their growing environment, including temperature, humidity, and hours of sunlight. The service also provides Alert and Recommend functions, as necessary.

The Agricultural Cultivation Support Service offers assistance based on scientific evidence at each step of the farming process, from raising seedlings, planting, and cultivation to shipment, thus enabling farmers to produce high-quality vegetables. In addition, process management and traceability are ensured through data accumulation, making it easier for producers to assure consumers of safety and security.

We are currently conducting demonstration trials in eight regions of China in collaboration with agricultural corporations, food manufacturers, and the agricultural sector of the Chinese government, with the aim of fully commercializing the service.