

Digital Transformation by NRI

Clearing a path to the future
with Digital Technology

Nomura Research Institute Group

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<https://www.nri.com/en/journal>

NRI JOURNAL



Nomura Research Institute Group



Are you ready for change?

The change is coming.

Information Technology is transforming the business models themselves rather than just improving business process efficiency.

Involving the entire industry, we, NRI, are envisioning the future that will be built through digital transformation.

True digital transformation cannot be achieved in a day. It requires a long-term vision and management strategy. It requires initiatives that include all the employees and operations across a company.

The future is unknown. We cannot see it - we have to build it.

We are forging a new future that will spur innovation.

The time to build that future is now.



Progressing together

We help our clients transform into digital companies equipped to thrive in the new era.

NRI has been increasing its digital transformation consulting work since 2010.

With a track record of success, NRI supports customers' digital transformation efforts including management strategy, business transformation, the use of the latest technology and secure systems operation.



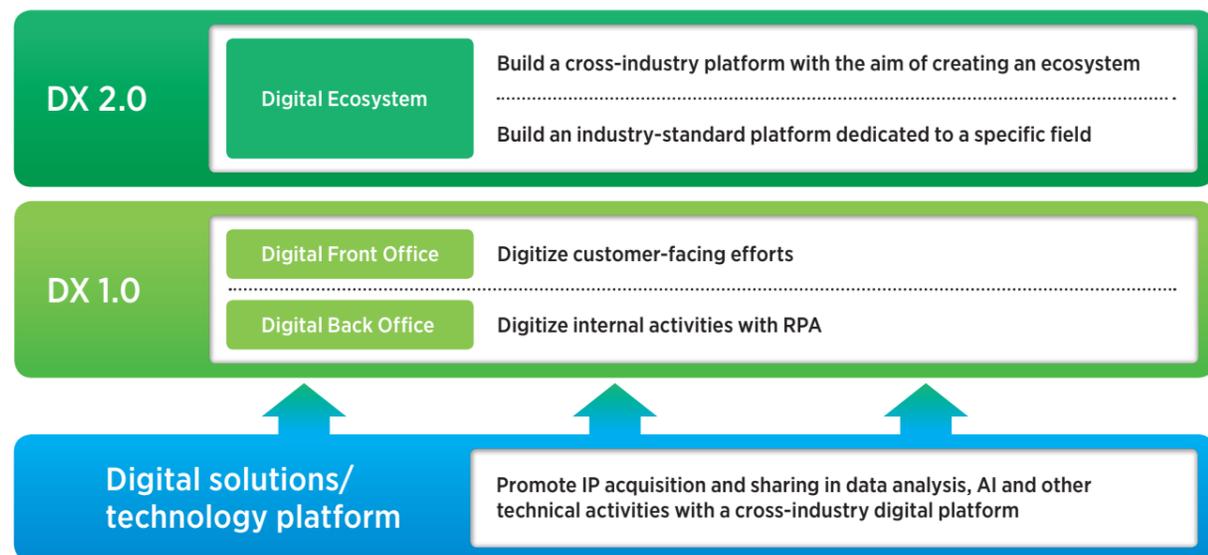
Support Digital Transformation (DX) Efforts by Providing both Consulting and Solutions

In the process of digital transformation, a company needs a strategic partner. We work hand-in-hand with our customers through repeated cycles of hypothesis testing to create new businesses; this is our "Consulting and Solution" approach, with which we help companies achieve digital transformation.

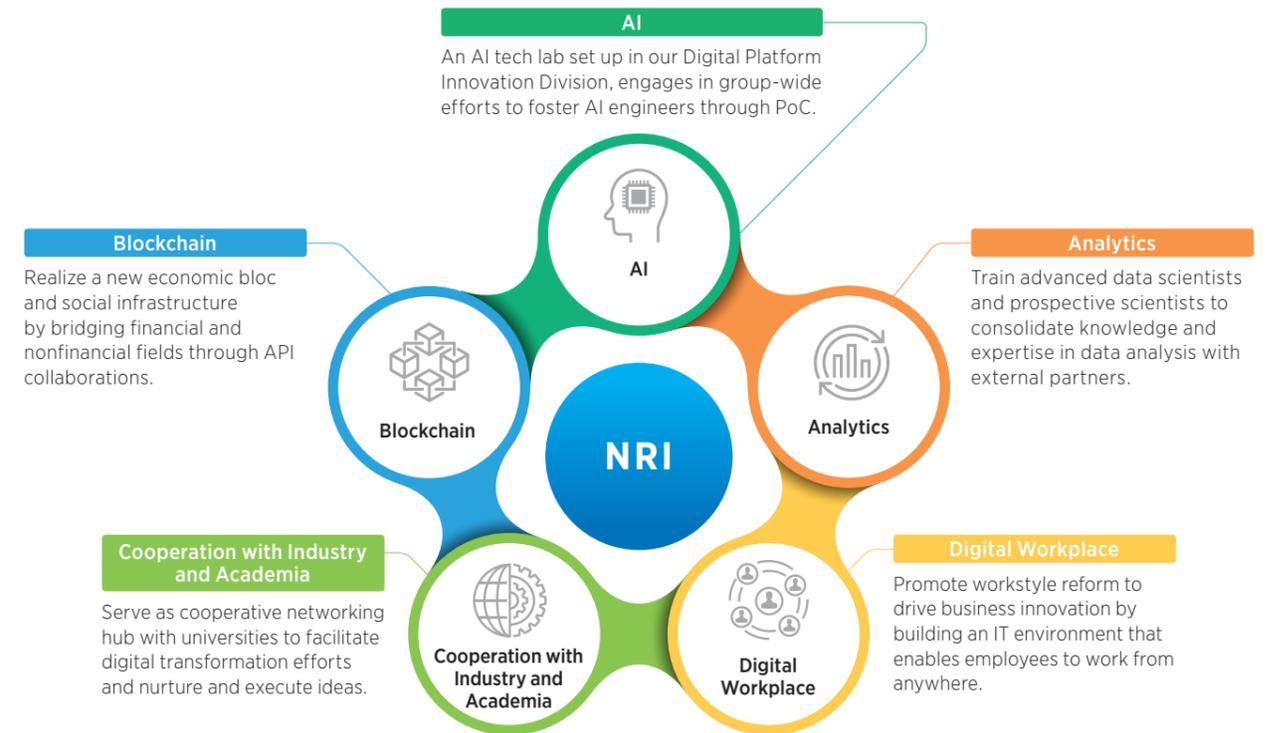
NRI defines corporate digital transformation efforts in two ways:

- DX1.0 : digital transformation that reforms the operational processes of an existing business.
- DX2.0 : digital transformation that creates a brand-new business model using digital technology.

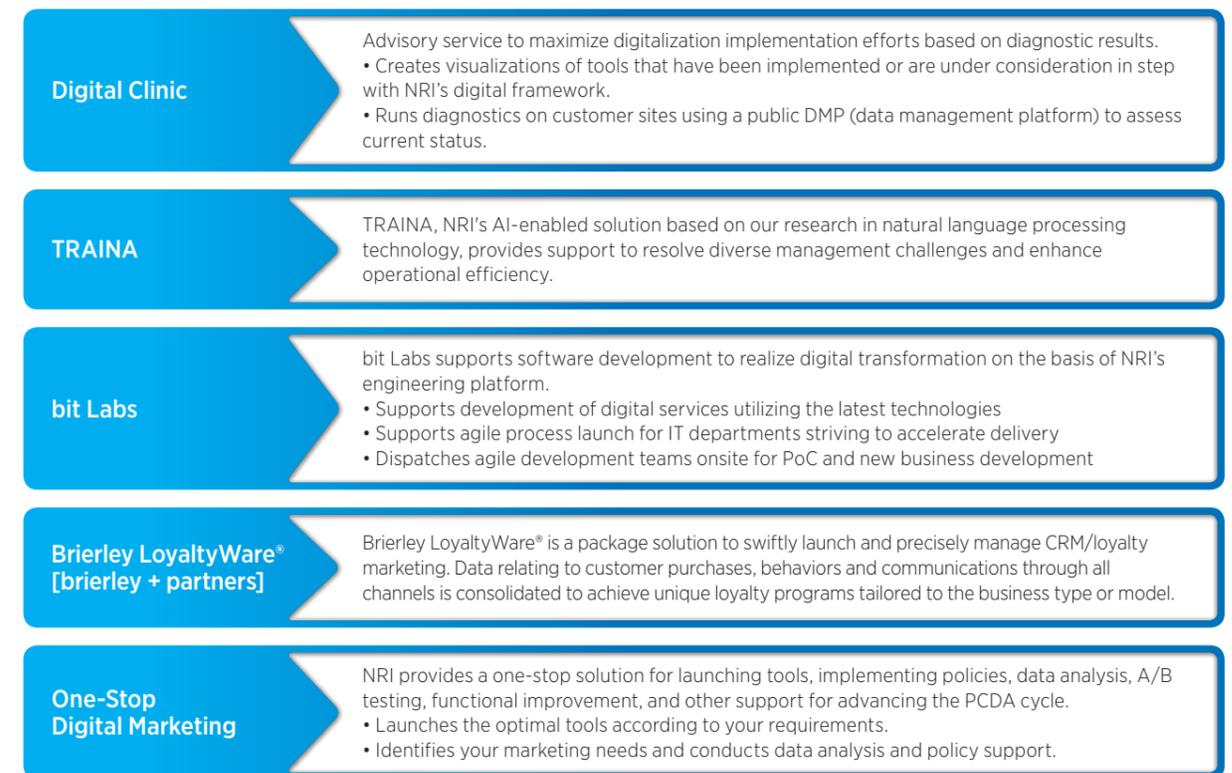
NRI's Digital Business Strategy



Our Group-wide Digital Technology Initiatives



List of Digital-related Services and Solutions



Building together

We go beyond the capabilities of a single company – to bring cutting-edge ideas to fruition.

NRI partners with different kinds of companies to spur business.

Through open, joint communication between companies with quality ideas, we create value in ways that breaks the mold.



Driving a paradigm for new business and new society with the power of digitalization

Japan Airlines and NRI partner to rediscover Japan's appeal and revitalize local economies

Dokokani Miles www.jal.co.jp/jmb/dokokani/ (Japanese Only)

Through joint development between Japan Airlines and NRI, a service for reward flight tickets for domestic routes now allows customers to go to one of four potential destinations displayed at random for fewer miles than usual. It incorporates an algorithm developed based on a patent held by NRI. Customers need only 6,000 miles—less than half of the usual requirement.

This service was launched in December 2016 to expand travel opportunities for customers who do not have the required number of miles for reward flight tickets and to facilitate the rediscovery of the appeal of different areas in Japan and revitalize local economies.



First Blockchain Diagnostic Service in Japan

Ensuring blockchain security essential for the era of DX <https://www.nri-secure.com/security-consulting/blockchain-assessment>

Blockchain technology has attracted attention not just for digital currencies, but also in finance and other diverse industries. While blockchain technology is difficult to tamper with and highly usable, recovering damage from a cyberattack is extremely difficult. NRI SecureTechnologies is the first in Japan to provide “smart contracts”—an important technical element for utilizing blockchain technology – and other technical elements unique to blockchain, as well as a security diagnostics service for addressing overall systems that use blockchain.

Awarded in U.S. for track record in implementing AI solutions

Support digital transformation of financial institutions. https://www.nri.com/en/news/newsrelease/1st/2018/cc/0516_1

NRI won Best Artificial Intelligence (A.I.) Initiative at the FTF News Technology Innovation Awards 2018. This award recognized NRI's achievements in verification testing and implementing solutions that utilize AI. The awards were established by Financial Technologies Forum (FTF), a widely-known media outlet dedicated to finance-related topics, and recognize achievements of financial technology companies, service providers, and audit agencies during the previous year.

Bringing together NRI's comprehensive strengths in the digital realm <Order of Public Announcement>

Brierley + Partners Japan

<https://www.brierley.com/>

The Japanese arm of NRI Group company Brierley & Partners (U.S.) was established to expand CRM/loyalty marketing business – which has been recognized as No. 1 in the U.S. – into Japan and Southeast Asia. It is the first company in Japan to specialize in loyalty marketing. It achieved innovation in CRM/loyalty strategy in many industries through high-quality digital marketing solutions.



NRI digital

www.nri-digital.jp/ (Japanese Only)

NRI digital supports business transformation, by utilizing the power of digitalization and combining wide-ranging capabilities and expertise in diverse industries. While gathering consultants and system engineers into a single organization, making it a place to spur open innovation, NRI Digital provides three services : Digital Business Consulting, Digital IT Solutions, and Digital Analytics.



bitREALTY

www.bit-realty.com/ (Japanese Only)

bitREALTY is an online real estate investment platform built by Kenedix, the largest independent real estate asset management company, and NRI, which has an extensive track record in the world of Financial IT solutions. By providing investment opportunities through the internet to invest in unlisted real estate funds previously limited to certain investors, bitREALTY supports asset management for a broad class of investors. While maintaining the discernment of real estate professionals and high transparency, and using a platform backed by cutting-edge IT, bitREALTY provides a true alternative to investing in stocks and bonds.



KDDI Digital Design

www.k-digitaldesign.com/ (Japanese Only)

KDDI Digital Design, a joint venture of KDDI and NRI, leverages the strengths of NRI in strategy consulting and systems integration and KDDI in building next-generation networks and IoT platforms to provide comprehensive support from drafting corporate digital transformation strategies to commercialization verification and system architecture. Digital transformation is spurring a shift in companies' IT investment towards “Business IT” which leads to sales expansion and new services. KDDI Digital Design puts the focus on swiftly launching business and maximizing results to contribute to development of society and industry.



TECHNIUM

www.technium.net/ (Japanese Only)

With the recent trend of digitalization, the possibilities for service manufacturing and customer interaction continue to expand. This makes AI, IoT, and related technologies more important than ever. NRI teamed with DMG MORI CO., LTD., which holds advanced technology for machinery, processing, and software, to establish a joint venture with Technium. Technium is dedicated to providing systems and services that support advanced utilization of manufacturing equipment in factories through the use of digital technology. As a total solutions provider using digital technology, Technium will contribute to the health of the manufacturing industry through new services.



NDIAS

The NRI Group's dedicated information security company, NRI SecureTechnologies, entered into an agreement with DENSO corporation to establish K.K. NDIAS in December 2018. This joint venture will carry out cybersecurity business focusing on security assessments for automotive electronics. The importance of cybersecurity for automobiles is growing with the rise of autonomous driving and the proliferation of internet-connected cars. The new company will provide security diagnostics for automotive electronics and consulting services from the vehicle development stage to post-mass production.

Evolving together

We discuss the shape of future society with experts.

As the world is changing at a rate faster than ever, we need to completely change our existing approaches to management and business.

NRI annually brings together experts to consider the shape of the future world with its focus on "Clearing a path to the future with Digital Technology."



Get innovation ideas here NRI Journal

Insights and ideas for future innovation through diverse perspectives.

<https://www.nri.com/en/journal>



Roadmap for "Clearing a path to the future with Digital Technology"

Three-Year Plan for NRI annual Forum Hosted every fall in Tokyo.



— Now is the time to choose to build the future —

"At NRI, where our corporate philosophy is "Dream Up the Future," we've conducted multi-faceted studies of "Clearing a path to the future with Digital Technology." This book is the first part of the results of that research. You will find the essence of digital capitalism and three scenarios regarding the shape of the economy and society expected in the future. We hope this publication will inspire you to think about the sort of future you want to build."

Shingo Konomoto, President & CEO, NRI

" Digital Capitalism "

Edited by Shingo Konomoto, President & CEO, NRI
Written by Takeshi Mori and Hiroyuki Nitto
Published by Toyo Keizai Inc.





Creating Digital Businesses that Engage with Customers — The Necessary Perspective for Digital Transformation



Now that the Internet, smartphones, IoT, cloud services, and other digital technologies have become indispensable for business, efforts are underway to utilize these technologies for the business model innovation known as “Digital Transformation” (DX). However, few companies see the success with their DX efforts. We sat down with Masakazu Amamiya, CEO of NRI Digital, who is experienced in utilizing digital technology for business creation, and asked him how to ensure the success of DX initiatives.

Masakazu Amamiya CEO, NRI Digital, Ltd.

Direct Connection with Customers Gives Rise to Business Model Innovation

Why are companies focused on DX right now?

One reason is that Internet technologies and services have evolved rapidly and now directly connect companies with consumers. For example, when consumers register online for shopping, a company can learn the specific information that people are interested in. By leveraging this kind of data, companies can now offer products that cater to individual consumers.

You can say the same thing about BtoB business. IoT directly connects companies with client companies through plant machinery and equipment, and therefore these companies now can manage equipment operating rates and the timing replacement purchase real-time using data. As a result, there is less need to distribute resources such as sales hubs and stocked warehouses across the country than before. By utilizing digital technology, manufacturers and other businesses can make their sales and after-sale service frameworks more compact and realize business models that are less cost-intensive.

The key to producing results through direct connections with customers lies in whether you can organize information that’s beneficial to customers—like where and how a product can be used—in an easily accessible manner and distribute that information appropriately. Providing valuable information leads to increased sales and greater resource efficiency.

The Importance of Utilizing Customers’ “Real-Time Information”, Rather Than Just Past Information

When you have direct communication with customers, it becomes easier to gather their “real-time information”. For a while now, it has been common to use past customer information that has been stored to offer optimal products. However, data from the past will not give you “real-time information” like “who wants this product right now?” or “what are people interested in now?” It is digital technology that makes this information available—specifically, the smartphones that are always by users’ sides play a large role. Utilizing features unique to smartphones now makes it



possible for customers to be influenced or motivated at specific times.

Creating Products that Utilize the Specific Characteristics of Digital Technology

The realization of less cost-intensive business models by making direct connections with customers and increased sales utilizing customers’ “real-time information” are made possible by DX, which greatly contributes to increasing companies’ profitability. The next task for companies is to figure out what products to sell. Another key point of DX is how to utilize the characteristics of digital technology to create attractive new products and services that are appealing to customers and that previously did not exist.

There is a cosmetics manufacturer that is developing a unique cosmetics service for women. Using skin information captured by a smartphone camera as well as climate and mood information, it can dispense personalized cosmetics suited to conditions at any given time from a customer’s own device. This is truly a new product made possible only by digital technology that utilizes customers’ “real-time information”, and it could be called a new business model.

How to Reap the Benefits of DX

While DX is thought to play a large role in business growth, it is also a fact that many companies feel that it has not produced the results they expected. Why is that?

One reason is that they can end up focusing too much on increased sales, and neglect cost-cutting effects. Sales are an important indicator, but cost reduction is also a benefit of DX.

Sometimes PoC projects are carried out for the reason that they are intriguing, but it is essential to distinguish the scope of a project. In cases where a department pursuing DX creates a product sales site as a proof of concept, puts in place a chat service or other method for communication exchange, and provides the options of purchasing through the site right away or after discussion with a representative, it seems to have become difficult to gain on-site help because of the increased workload. There are many cases in which a PoC does not lead to an actual service, and recently “PoC fatigue” has become common parlance. DX requires many changes and innovations to existing organization. If DX is not pursued on a company-wide basis, the expected results may not materialize.

Efforts with Machine Manufacturers and NRI

One case study of DX is Technium, a joint enterprise established in January 2018 by NRI and machine tool manufacturer DMG Mori Seiki Co. Technium aims to support customers in DX by embodying the expertise of manufacturers in software and services and providing these through digital channels. NRI Digital supports the planning, development, and marketing for these services. Going forward, we hope to pursue many projects to create digital businesses together with customers.



An Approach to Achieving CX/UX in the Digital Age



As our world becomes increasingly digitalized, we are seeing a greater emphasis on the value of experience in the form of “CX” (customer experience) and “UX” (user experience). And to deliver this experience, it’s essential to have a “design thinking” approach that grasps the fundamental issues for our customers and users and creates real value, says NRI’s Atsuko Takai. We asked her about the key points to keep in mind for delivering a better CX/UX.

Atsuko Takai Systems Design Consulting Department, Nomura Research Institute, Ltd.

CX/UX as the Key Differentiator

—Why are we talking about CX/UX so much? If we simply keep improving our products and services from a technology-oriented approach as we traditionally have, we won’t be able to beat our market competitors. The key is to focus on how we can deliver value to our customers, and to distinguish ourselves by giving them experiences they can’t get from other companies.

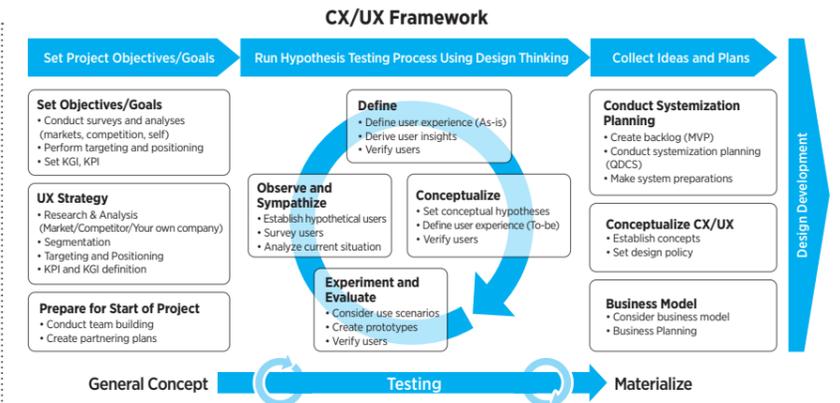
—Are CX/UX an extension of improving UI (user interface)?

The usability of UI does affect the UX, but the UX isn’t limited to the interface—it has to do with the experience someone has when using a product or service. With UX, the emphasis is on providing the customer with a pleasant experience. For instance, there are various points of contact between customers and companies, like with searches done or orders placed on company websites, product delivery, and the use of call centers for inquiries. The cohesive, total experience that customers have throughout these processes is what we call CX. The manner of interacting with websites, the manner of interacting with call centers, and other experiences at individual points of contact—these are what we usually call UX.

UX doesn’t focus only on customers, it includes sales reps and sales staff in stores, call center operators, and other employees as well. That’s because an employee’s UX involves enhancing the quality of customer service, and ultimately leads to a better CX. With the increased mobility of human resources in Japan, it’s necessary to make good use of temporary staff and a diverse group of employees, and in that context UX also affects the quality of your business operations and your training costs.

Producing New Value with a Co-Creative Approach

—Are the initiatives being undertaken by Japanese companies making any headway? My personal impression is that there are many companies that believe they have to do something new with digital technology, but they don’t know what to use or how to use it to get the results they want. They seem to be groping in the dark for answers. Now, we’re seeing more companies attempting to incorporate “design thinking” as a way to solve the fundamental problems and needs of their customers, but so far only the phrase itself has caught on, and there are few examples of companies that have succeeded in fleshing it out.



—How specifically should companies go about achieving these experiences?

Conventionally, they’ve begun with analyzing their business environment or market and tech trends. With CX/UX design, you start with probing your customers’ needs, determining the value of your services or systems, and figuring out the essence of the problem. It involves uncertainty and considering new ideas that aren’t just an extension of traditional thought, so processes that use design thinking are well suited to the task.

With design thinking, you take a sympathetic view of your users’ sentiments and behaviors, and come up with hypotheses and scenarios about when and how your users will be getting their experiences. Along those lines, you have to alternately broaden and narrow down your ideas about what sorts of features or services you want to provide, as you create various prototypes and then evaluate them while letting your end users try them out. This is the process you use to really solidify the concept.

These kinds of projects often use a co-creative approach involving a variety of people, with the key points being visualizing and quantifying your users’ experience, sharing that vision among the relevant persons and reaching a consensus, and continuously running short-cycle tests.

Having Shared Goals Requires Fostering a Customer-Centric Mentality

—What aspects of this integrated process are particularly vital? The first thing to do is to reach a firm consensus with all the groups involved about your shared goals, namely which customers you want to target and what kind of experience you’re looking to deliver.

For instance, if you ask companies that are have problems with their existing systems, they’ll tell you they want to boost their ability to attract new customers, or to eliminate the difficulty of using the web for their call centers, or that it’s important to have their existing customers keep using their services. In other words, each business segment has its own ideas and conception of its customers, and it’s often difficult to come to a consensus. However, all business segments are either directly or indirectly involved in creating experiences, so if you set a single goal, it’s often possible to achieve your other objectives as a secondary effect.

Rather than thinking in terms of optimizing the individual contact points with your customers, you have to conceive of things from a “total” approach for delivering experiences that are consistent across all contact points. For instance, Amazon doesn’t only provide a web-based purchasing experience, it goes further by using its logistics infrastructure to ensure that products are rapidly delivered and ready to use. It delivers experiences that encompass the entire range of consumer behavior.

—Are there any improvements Japanese companies should make to think with a more “total” approach?

Companies need to foster a culture and a mentality that’s more customer-centric. They would probably then need to integrate their multiple interested business segments to create an organization that can broadly observe their customer contact points as a whole. NRI is here to help, and so we’re conducting digital thinking training to encourage the development of this mentality. Taking a co-creative approach with our customers, we hope to provide total support from the initial conceptualization stage all the way to practical application towards solutions and ultimately development.



On the Advantages of a Cashless Payment



Japanese people tend to prefer to use cash when making small payments, but this preference is likely rooted in a lack of understanding of the major costs involved in using cash. Going cashless offers certain advantages that could boost the economic efficiency of Japanese society overall.

Takahide Kiuchi Executive Economist, Financial Technology Solution Division, Nomura Research Institute, Ltd.

The Use of Cash in Japan is Conspicuously High

The monetary value of all cash in circulation in Japan accounts for some 20% of nominal GDP, which is a conspicuously high percentage among the world's major powers. While debates occur for instance in the Nordic countries about the rapid decline in the use of cash, such discussions are nowhere to be heard in Japan. It would be no exaggeration to say that Japan is very much a cash society.

While there are conceivably many factors behind the popularity of using cash in Japan, some of the most representative ones are the following: (1) Japanese people tend to be sensitive about their personal information, and dislike having their transaction histories known to others, and thus they prefer paying in cash because their anonymity is safely ensured; (2) given Japan's high level of public safety compared to other countries, there is relatively little anxiety about carrying cash; and (3) the Bank of Japan takes every manner of precaution concerning the nation's cash supply, thus making it unlikely for cash shortages to occur in any region, as well as ensuring cleanliness of cash

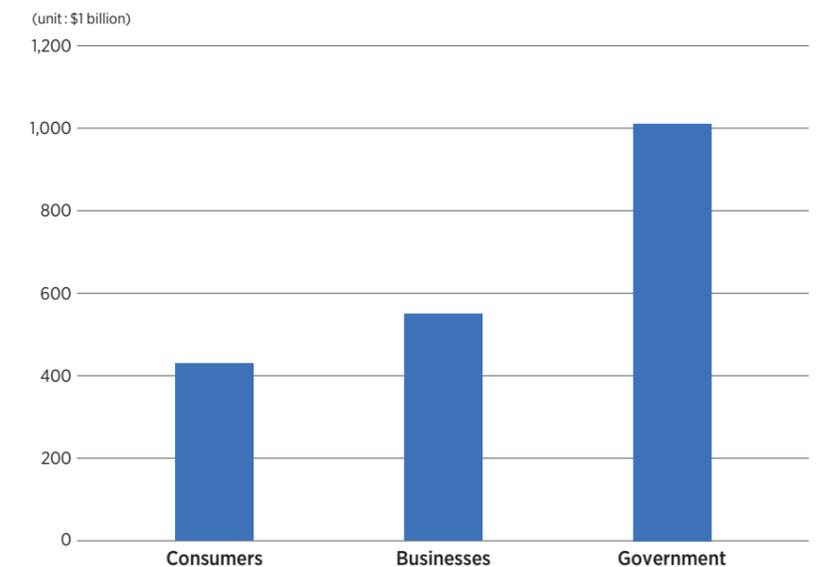
The Need to Acknowledge the Costs of Using Cash

Since most people in Japan lack any sense of the inconveniences attached to paying with cash, it is difficult to incentivize them to make more payments using other means, such as with their smartphones. However, this ability to use cash in this way without feeling any of the inconveniences actually comes at a significant cost. For example, the direct costs include the cost to produce paper bills and hard money, along with the costs to store and transport them, plus the labor costs involved in the handling of cash and the manufacturing and maintenance costs for ATM machines that dispense cash and receive deposits. These costs are shouldered by the Bank of Japan as well as private banks, but ultimately they do by and large get passed on to cash users. For instance, the Bank of Japan's cash-related expenditures result in a proportionate decline in its payments to the national treasury, which is a source of government revenue, and while these costs may be invisible to the public, the people do end up bearing them.

The Costs of Cash in the U.S. Estimated at Slightly Over 1% of Nominal GDP

A study was done by a research team at

(Chart) Estimated Annual Cost of Cash in the U.S.



Source: Bhaskar Chakravorti & Benjamin D. Mazzotta, "The cost of cash in the United States", The Institute for Business in the Global Context, The Fletcher School, Tufts University, September 2013.

Tufts University to estimate the true cost of cash. The study found that the cost of keeping cash in circulation in the U.S. amounts to more than \$200 billion per year, which works out to 1.2% of nominal GDP.

The study breaks down the cost of cash into three segments, namely consumers, business, and government, and estimates the respective cost for each segment. Yet the government cost estimate stands at \$101 billion, more than double the cost for individuals or the business world. This breakdown includes not only the costs of producing and manufacturing coins and paper bills, but also declines in tax revenues caused by tax evasion using cash, for example.

Cost of Cash in Japan Estimated at Over 16 Trillion Yen (\$145 Billion), Amounting to 3% of GDP

Given that Japan has a cash-to-GDP ratio that's 2.5 times higher than in the U.S., if we simply apply that ratio to the above calculation, the amount of cash in circulation corresponds to 3% of Japan's GDP, meaning that a cost of 16.5 trillion yen (\$145 billion) is racked up every year in Japan from the use of cash.

We must comprehend the cost of using cash on a broader conceptual level. In many countries, cash (in particular, large-

denomination bills) is very often the type of currency involved in crimes. If we posit that postponing the transition to a cashless society in a sense encourages criminal activity and causes a deterioration in public safety, then this delay can be construed as a social cost. We can also observe that using cash involves a hygienic cost. There is the potential for infectious diseases to be spread through the use of paper bills and coins, as well as for terror attacks to be carried out using contaminated money, and these too can be counted among the costs of using cash in a broader sense.

If we consider the cost of cash in this sort of broader meaning, it could potentially balloon up to a huge scale. Conversely, by promoting the switch to a cashless world and reducing the use of cash, we can lower the costs borne by society overall, and boost our economic efficiency. The potential in going cashless could be quite significant indeed.



Analytics as a Source of Competitive Advantage for Companies —Two Key Points for Producing Results



“Analytics” is a keyword that’s getting a lot of attention from companies today. Previously, we saw the business world focus on “big data”, another keyword representing the existence of mass data that can be leveraged on a global scale. Currently, interest among businesses is shifting toward the question of how this mass data can be put to use for management purposes. We spoke with Shigeki Natori, an NRI member working to help companies reinforce their competitive advantage using analytics, about the keys to producing results.

Shigeki Natori Principal, Analytics Business Promotion Department, Nomura Research Institute, Ltd.

Using Data to Enhance the Quality of Decision-Making

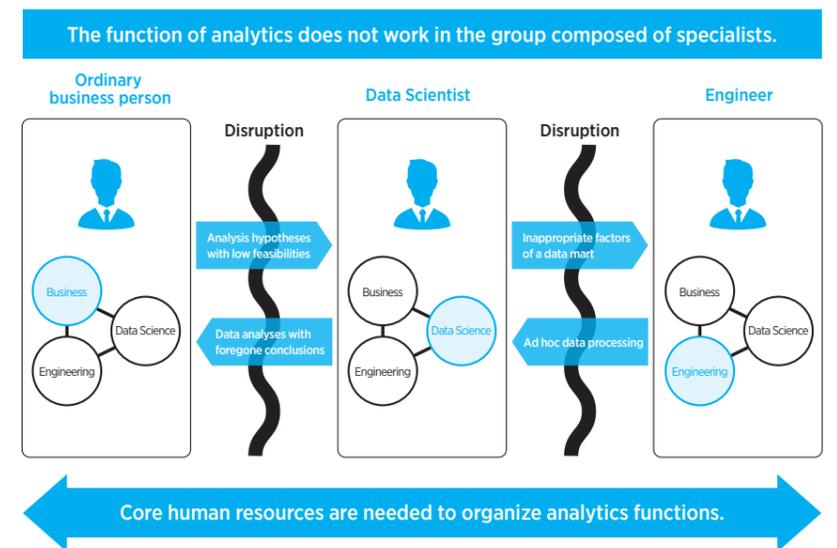
Analytics refers to the use of various types of data to enhance the quality of decision-making done in a wide range of domains, including corporate management, business projects, and operations. For instance, a certain industrial infrastructure company has found that by leveraging its equipment sensor data, it’s now able to make equipment investment decisions that are better suited to its actual operating conditions than ever before. This increased sophistication in decision-making makes a dual contribution, helping the company to provide its customers with stable services and to optimize its costs. At another consumer services company, the use of large amounts of data has made it possible not only to recommend the ideal products and services to customers who visit its stores, but also to make suggestions that anticipate any concerns that customers may have, thereby eliminating any discontent and raising customer satisfaction. With other possible applications including raising operational productivity, placing personnel in more appropriate posts, and predicting risks, it’s clear that analytics has the potential to be used for myriad purposes.

Letting Companies “Try Things Out”

One factor behind the growing level of interest in analytics is that for many companies, analytics initiatives are an easier undertaking than ever before. Companies now have far more options available as far as the data they can use, while analytics tools, using open source computational languages such as R or Python, now make it possible to employ the latest algorithms without incurring costs. Meanwhile, analytics platforms allow companies to take advantage of “pay-as-you-go” cloud services in fashioning analytics environments where mass data can be processed with low initial investments. I think the fact that technological progress has made it realistically possible for companies to more freely “try things out” is a significant recent development.

How to Get Results (1): Specify Use Scenarios

Another aspect of analytics is that when implemented properly, it can enhance a company’s competitiveness, but if



not done correctly it can easily lead to missteps. According to one questionnaire survey, nearly 40% of companies that are seeking to make the best use of their data have been unable to achieve their desired results.

There are two key points when it comes to getting results with analytics. The first is that you have to envision specific scenarios for how data is to be used. With companies recently having gained more options in the kinds of data they can use, it’s become very common for them to begin their study by sorting and synthesizing it, but ultimately the important thing is what you aim to accomplish by using data. The key is to begin by understanding your business challenges, and to concretely define the purposes and use scenarios for your data early on in the study process.

How to Get Results (2): Cultivate Core Personnel

Another key point is the need to systematically cultivate core person for handling analytics at your company, and to do so from the initial stages of study. Generally speaking, analytics requires three different skill sets: business, data science, and engineering. It’s extremely rare for personnel to have all three of these, but for core personnel they’re essential.

Procuring human talent who excel at one or another of these skillsets is a relatively

easy to do, but securing personnel who are well-versed with your company’s particular business is no simple thing. Based on past experience, the approach that I most recommend is that when launching PoC (Proof of Concept) testing on analytics, you should choose and engage core personnel candidates who have a broad business perspective and don’t have an aversion to math or statistics, and then have them further their expertise through actual activities. When it comes to putting together a study team, since analytics requires a broad range of expertise, it’s not good to have people who are too self-sufficient or who delegate all the decision-making responsibility to others. I think that moving forward with this one step at a time, accumulating knowhow on the use of data, and fostering a culture for it as an organization will lead to greater competitiveness for your company in the future.



Protecting our motorized society from cyber-attacks



In recent years, connected cars, connected to the Internet and offering a variety of convenient functions, have become increasingly common. With that, has come a government push towards getting even higher-level self-driving automobiles on the road by 2020. Automobiles are becoming an increasingly comfortable mode of transportation. These developments, however, bring with them the risk of cyber-attacks—something that would not have been possible against cars in the past. Here at NRI SecureTechnologies (hereafter “NRI Secure”), we have valued the importance of security since ten years before the term “IoT” (Internet of Things) was even coined. We asked Daisuke Noguchi, an NRI Secure consultant who researches car security technologies, what we need to do in order to keep our cars safe in the future.

Daisuke Noguchi NRI SecureTechnologies, Ltd.

Terrorism, theft, pranks

What kind of cyber-attacks are possible against automobiles, and what dangers do they pose? Noguchi discusses three possibilities.

“The first possibility is terrorism. Unauthorized remote access would make it possible for a terrorist to take control of the steering function, make it so the brakes don’t work, or even lock the doors. All of these can be a threat to human lives. The second possibility is theft. Criminals can alter the data in a car key to gain access and steal the car for themselves. Third are so-called pranksters, who might take control of a system to open and close people’s car windows, or turn their indicators on and off.”

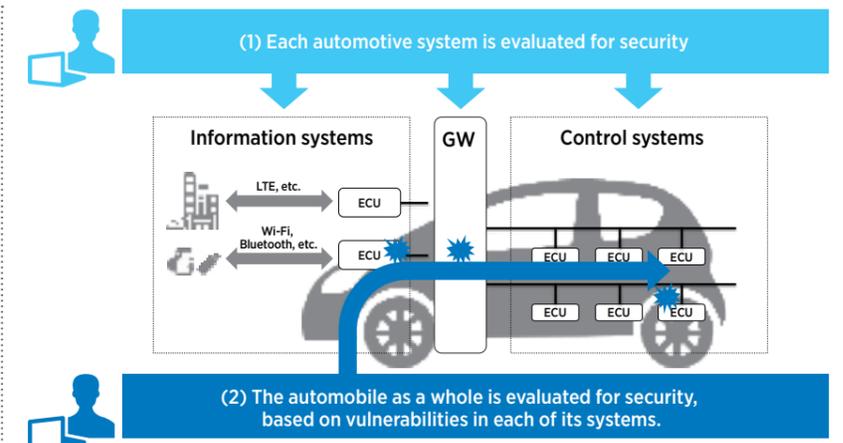
These things are possible because, like smartphones, automobiles nowadays are connected to a variety of external networks and devices, which gives attackers who gain unauthorized access into the system the ability to control the car’s actual driving mechanisms. “It’s like cars have become toys, turned into remote control cars,” says Noguchi.

Implementing the Automotive Penetration Test

Automobile manufacturers have taken this danger into account, and since a few years ago have begun working to handle this issue, establishing security offices within their companies. In May 2017, we at NRI Secure released a service called the “Automotive Penetration Test,” aimed at automobile manufacturers. In this service, specialists at NRI Secure attempt to infiltrate the automotive systems of the car and gain remote access to the car’s engine, brake, door lock, and indicator controls, much like a hacker would.

The cars are evaluated through broad and detailed criteria based on standards like the EDSA, an international standard for control equipment. We report on any vulnerabilities and suggest possible solutions, so that the automobile manufacturer is able to strengthen the security of their cars.

The equipment installed in automobiles can be classified largely into three categories: information systems, which connect to external networks or devices; control systems like the brakes and steering wheel, which control the body of the vehicle; and gateway (GW) technologies, which separate these two systems. If an information system is attacked by something like an external



ECU: Electronic Control Unit. ECU refers to the computer installed in automobiles, and controls things like the engine, transmission, ABS (anti-lock braking system), and EBD (electronic brakeforce distribution system).

network, the attacker may infiltrate the control system via the GW, which would allow them to manipulate the vehicle.

The need for a continuous monitoring system for security

Though these security evaluations are effective for the time being, Noguchi says that continuous security monitoring will be what is important in the future.

“Until now, with regards to the product cycle, there was no real need to tweak anything on the automotive systems and equipment on cars that people had already bought, unless they were recalled. But now that cars are connected to networks, there is a need to preserve security throughout the life-span of the vehicle, even after it is in the hands of the consumer. Systems must be continuously monitored for issues, and there must be countermeasures in place against any issues. In this sort of circumstance, we believe that continuous ‘monitoring,’ to check whether any systems are under attack, will be of particular importance.”

Utilizing our long-term, multi-lateral experience, and the strength of our specialists

Connected cars will come into widespread use in the future, and are expected to make up over 90% of the new cars that are sold in 2035. Self-driving cars will also become increasingly common as their technologies become more refined, their range of use increases, and many more

of these cars show up on the road. As this occurs, the traffic on automotive systems and the number of external connections will increase and the technology will become more sophisticated, bringing with them an increased risk of hacking. Noguchi says that for this reason, “it is very important that we have a system to monitor car security. This kind of system will serve as an important part of the infrastructure to preserve safe driving into the future.”

“So far, we at NRI Secure have provided one of Japan’s only advanced monitoring services in the field of information security. Over ten years ago, we began to alert to security threats to control system infrastructures for things like electricity, gas, and water, back when society still didn’t understand the importance of such security, and have dedicated ourselves to providing security measures to handle these threats. We have also had experience monitoring the information systems of financial institutions, which are under heavy threat of attack. We plan to utilize these experiences, which span a variety of fields, to help realize safe driving in future society.”

NRI Secure is home to a team of white-hat hackers (ethical hackers) that include former winners of world hacking tournaments, as well as professionals with experience in the information security field across a variety of industries. NRI Secure will utilize these strengths as we dedicate ourselves to the realization of the safe, motorized society of the future.



Shiseido Japan × NRI Combining Cutting-Edge Skin Science and Technology

Shiseido Japan's Optune skincare system delivers optimal care for each customer's skin condition, and NRI has supported Optune's development as a member of the project. We asked people from both Shiseido and NRI who worked on the project how this unprecedented business in the cosmetics industry came about, with features including personalization backed by IoT and AI, the development of a dedicated machine, the launch of a beta version, and the subscription business model.



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Digital technology enables the creation of groundbreaking skincare

The Optune project started in January 2017 and was carried out at a brisk clip with the mission of developing a new, unorthodox business model from a consumer's perspective and the goal of a market release by the first half of 2018. Even for Shiseido, with its 145 years of dedication to meeting the wide-ranging needs of customers through counseling by beauty advisors and its multi-brand strategy, it was inconceivable to customize a product itself using digital technology, says Shiseido Japan's Michifumi Kawasaki, who led the project.

Michifumi Kawasaki, Shiseido Japan
It all began with the out-of-the-box concept of using different volumes of different cosmetics products depending on "fluctuations" in one's skin condition, rather than always applying the same volumes of the same products. This radical idea led Kawasaki to envision a new service composed of sensing, analyzing, and solutions, and he says it was then that he realized how the use of IoT could bring about a more advanced level of personalization in skincare.

With the new service, customers first use the Optune smartphone app to take images of their skin and evaluate its condition. The climate, the user's mood, and other factors will also be taken into account and data will be analyzed by a cloud server. Based on dermatologic intelligence that Shiseido has accumulated over many years, its proprietary algorithm will calculate an optimal combination of serums and moisturizers and their optimal volumes, and this information will be communicated in real time to the dedicated dispenser machine at the user's home. The machine contains five cartridges chosen for each user, and dispenses serums and moisturizers in over 1,000 combinations. This is how Optune delivers care that is tailored to the user's skin condition in a given moment.

In-house approach doesn't work for development in the digital age

Keiichiro Hisano, Shiseido Japan
Still, it would have been extremely difficult for a company that had been making nothing but cosmetics to develop everything from cartridges and a dedicated machine to a system and all peripheral support involved in a service within one year, says Shiseido Japan's Keiichiro Hisano, who was in charge of the business model and systems development. "In particular, when using IoT and digital technology, it's impossible for a single company to provide the value that customers expect. It was challenging for us to adopt the approach of having other professional companies on board and to move the project forward together."

So NRI, which had provided systems support for Shiseido's "watashi +" and "hada pasha" services, joined the project, and handled systems development and other responsibilities. "NRI paid close attention to everything from challenges in executing the new income model of cartridge sales and the monthly subscription fee to alliances with various partners and hammering out requirements. They took an active role in moving the project forward, so it was really helpful," Hisano says.

Using data to deepen marketing

Misuzu Kondo, Shiseido Japan
Six months after the launch of a beta version, Shiseido is using the tremendously increased collection of data to explore the type of message to be sent as part of effort to encourage continued use, as well as the timing for sending such message, says Shiseido Japan's Misuzu Kondo, a CRM* officer. Previously, with online purchase histories and POS data, the company was unable to understand how customers used



Optune App (a dedicated smartphone app) and Optune zero (a dedicated dispensing machine). Optune Shots (serums and moisturizers to be set in Optune zero)

products after buying them. But "because customers turn on their machines and place their hands in them, we now know how many times and how often customers use the product; this is information we didn't have before. I feel this will lead to a major CRM innovation. But this is an area where existing marketing knowhow doesn't work, so we are doing trial and error with NRI to create a logic model."

Satomi Tanabe, NRI
"To find out where the customer is stuck and what problems they have, we look at data with everyone and have discussions, and we discover something new every day," says NRI's Satomi Tanabe, who was involved in the project as a whole and supports data analysis.

Aiming for ultimate personalization

"Optune's brand value may change drastically depending on how satisfied customers are with the results of the customization, and this makes it an unprecedented challenge. Analysis will need to be more precise going forward, and this is where NRI can provide full support," Ms. Tanabe says enthusiastically.

"We want to deliver optimal skincare all the time to people who are busy with work and/or parenting and thus don't have time to find the cosmetics products that work for them. So we're refining the system and the business model for a full-blown launch," says Kawasaki, adding the following vision: "Down the road, we want to try to achieve the ultimate personalization by developing sensing technology that, for instance, can detect the skin condition when a customer simply stands in front of the bathroom sink, as well as by enhancing the analysis accuracy using image analysis technology, and bringing the Optune service overseas."



*CRM Customer Relationship Management: An organizational effort to maintain and strengthen customer relations. The goal is to improve productivity and enhance the enterprise value through this effort.



Challenges for YEBISU BAR “Enjoyable” experiences create loyal customers

Sapporo Lion, NRI and NRI Group member Brierley+Partners Japan (“Brierley Japan”) joined forces for YEBISU BAR, a beer pub with 19 locations where guests can truly enjoy what Sapporo’s Yebisu Beer has to offer, and launched in May 2018 the YEBISU BAR app, a service for increasing customer loyalty. We asked people from the three companies who were part of the project what new discoveries were made as they introduced a program different from conventional point-earning loyalty programs.



Takayoshi Endo Marketing Department Manager, SAPPORO LION, Inc.

Tomoyuki Arao Executive Account Manager, Brierley + Partners Japan

Masao Iida Industrial System Business Department, Nomura Research Institute, Ltd.

YEBISU BAR app rewards all guests

Many restaurants offer loyalty programs. However, if someone in a party collects money and pays for the group’s bill, only that person earns points and others don’t. Many loyalty programs simply let customers who reach a certain number of points redeem rewards such as a discount of, say, 500 yen (approximately \$5), or cash back of a flat percentage; they do not take into account how often customers visit, how much they spend, and their loyalty levels. Moreover, even if restaurant operators want to use data obtained through their loyalty programs, the only types of information available to them are things like their patrons’ bill amounts, genders, and age groups, which makes it difficult to develop new services reflecting the tastes of individual customers.

Takayoshi Endo, Marketing Department Manager, Sapporo Lion
To address these issues, the three companies carried out a series of discussions and came up with the YEBISU BAR smartphone app. “When servers bring beer to customers, they put an electronic stamp directly on the customers’ phone screens. As they collect more stamps, customers move up in their status and earn rewards. There is also a member ranking that is updated in real time, and they can compete with other customers,” Sapporo Lion’s Takayoshi Endo explains.

“By adding the action of putting a stamp on smartphones that have the app open, you make it possible for all guests to earn rewards. They can check their ranking and status while dining, so they see how many more drinks they need to reach the next status. Enabling customers and waiting staff to act during dining, instead of after bills are paid, is a service that was surprisingly nonexistent before,” NRI’s Masao Iida points out. “Previously, we at NRI supported Sapporo Group mainly with their backbone systems, so developing a service for the point of customer contact was a new challenge for us.”

To encourage repeat customers, enhance the value of your experience, rather than offering discounts

Tomoyuki Arao, Executive Account Manager, Brierley+Partners Japan
In developing the YEBISU BAR app, the team sought to design a program that is distinctly different from conventional

loyalty programs which are substantially equivalent to giving discounts. “The more stamps customers earn, the higher the quality of the menu items they receive and the better treatment they get. We contrived the value and quality of service through rewards such as beer and food, so that customers will feel they want to go to YEBISU BAR,” says Brierley Japan’s Tomoyuki Arao. Using data from past events as their reference, the team examined the thresholds for stamps and the rewards from a customer’s perspective in an effort to enhance the value of the experience.

As a result, “membership is growing steadily, reaching 10,000 members in three and a half months. Some members have even topped 200 stamps, and we are surprised to see a stronger-than-expected reaction. We talked to these customers directly at the restaurants, and they said they were interested more in earning stamps and their rankings than in getting rewards. The real-time ranking stirs up customers’ competitive side, and this has a greater effect of encouraging customers to order ‘one more drink’ than we had expected,” Endo says.

With its survey feature, the YEBISU BAR app can also collect customer feedback. An analysis of responses has found that not only do customers enjoy earning stamps and competing with other users in the ranking, but they also enjoy reviewing their dining histories. Looking back at their histories—containing information such as when they had which drinks at which location—has the effect of making them want to go back.

Making the program work for other brands

“The combination of a smartphone app, which is digital technology, and waiting staff putting stamps on customers’ phones, which is an analog action, brought on more opportunities to interact with customers. Even though waiting staff now has an additional task in their job, fortunately they view it positively, saying that it has



YEBISU BAR app



brought them closer to customers. It was a little challenging to get the program off the ground, but with the warm support of NRI and Brierley Japan, we were able to ride it out. Today we feel that NRI, Brierley Japan and we make a single team,” a satisfied Endo says.

Masao Iida, Industrial System Business Department I, NRI “We began discussions in September 2017 and the launch was scheduled for May 2018, so the project had an extremely short timeframe and we did feel pressure. The reason we were able to move it forward successfully was that concerns were shared and decisions were made smoothly, and the concept never wavered along the way,” Iida says, looking back.

“We hope that by creating a point of customer contact with use of the app, this program will develop into something that will encourage customers who dined at YEBISU BAR to also drink Yebisu beer at home and those who drink beer on a regular basis to visit YEBISU BAR or Ginza Lion,” said Arao.

“In addition to reflecting customer feedback and enhancing the ranking system and rewards of the program, we also want to bring a similar program to Ginza Lion and other brands of restaurants down the road,” Endo said, sharing his vision.