# Best Engine Vol. 16

# In Pursuit of Better Identification in the Digital World

Kristina Yasuda Germany's Federal Agency for Disruptive Innovation (SPRIND) Project architect of the EU Digital Identity Wallet (EUDIW) initiative

### Naohiro Fujie

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**ITOCHU** Techno-Solutions Corporation

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Cover illustration by Miki Mohri





## Stepping Up

It has now been over six months since April 1, when I was appointed president of this company. During this time, I have traveled around the country visiting customers and speaking with them face to face. As I talk to people from a variety of industries, I am told that "CTC is an indispensable partner for promoting digitalization. We are counting on you." This makes me even more aware of my responsibility and fills me with the determination to deliver for our customers.

We also enjoy close ties with companies responsible for critical infrastructure such as telecommunications, electricity, transportation, and gas, and I was reminded once again of the important work we are doing to support society through our customers.

As the tide of digital transformation (DX) surges forward at an ever-increasing pace, many of our customers are facing challenges in promoting digitalization. "What kind of IT investment should we make to boost operational efficiency?" In order to become a partner that can quickly deliver the best solutions to such questions, we will continue to deepen our understanding of our customers' businesses, identify the essence of their issues, and hone our ability to offer unique solutions. As a core company in the ITOCHU digital value chain, we will work closely with a wide range of Group companies to accumulate case studies of successful DX promotion, store them as intellectual assets for the next stage of growth, and aim to step up and become a company that is always the first choice for customers.

With renewed resolve, we updated the CTC Group Corporate Philosophy in August, declaring that the CTC Group would become "ONE TEAM" to enter new and unprecedented territories in response to a changing world.

On a personal note, I was very happy to hear that my old high school, Taisha High School in Shimane Prefecture, made it to the quarterfinals of the summer Koshien tournament (the National High School Baseball Championship of Japan) for the first time in 93 years this year. As a systems integrator, we will continue to reach for greater heights, constantly facing the changes in the world and society. We will take on the challenge of helping to solve the problems of our customers and society, creating a sensation around CTC, much like Taisha High School did in the world of baseball.



#### Tatsushi Shingu President & CEO ITOCHU Techno-Solutions Corporation

Special **1** Feature

# In Pursuit of Better Identification in the Digital World

In today's world it is essential for people to be able to connect to each other on the Internet. So-called "digital IDs" play an important role by verifying people's identities in the digital space. The problems, however, are multifold, with constant incidents of data leaks, data tampering and identity theft. Furthermore, with vast amounts of personal data being concentrated in the hands of a small number of tech giants, the very concept of digital IDs is being called into question. Against this backdrop, Kristina Yasuda has been traveling around the world, working on the standardization and implementation in society of the new digital IDs. In the meantime, Naohiro Fujie, who has been working on the development of digital ID technology at CTC for many years, launched a joint research project with Keio University this year to explore what digital IDs should look like in Japan.

What are digital IDs? And what is the current state of play surrounding them? We caught up with Ms. Yasuda and Mr. Fujie to ask them about the key technology of "decentralized identifiers" and its underlying philosophy.

Coverage and text by Yuki Kondo

Kristina Yasuda

Germany's Federal Agency for Disruptive Innovation (SPRIND) Project architect of the EU Digital Identity Wallet (EUDIW) initiative Exclusive Dialogue General Manager, MIRAI Design Laboratory, ITOCHU Techno-Solutions Corporation





#### Kristina Yasuda

Germany's Federal Agency for Disruptive Innovation (SPRIND) Project architect of the EU Digital Identity Wallet (EUDIW) initiative

Born in St. Petersburg, Russia, in 1995 and raised in Sapporo, Japan, Ms. Yasuda is a graduate of the departments of political science and law at Sciences Po, also known as the Paris Institute of Political Studies. While still a student in 2016, she was appointed director of InternetBar.org, an American NGO that uses digital technology to support developing countries. She then worked for a consulting firm, followed by Microsoft in the US, before coming to Germany to take a position with SPRIND in 2024. She is now working on a project to create a new digital ID framework for Europe.

#### It Began with a Childhood Experience of Connecting to a Foreign Country

## —Tell us about your activities and initiatives up to this point.

**Yasuda:** I went to college in France, and while there, I became interested in the plight of refugees and other people who encounter difficulties because they do not have anything to verify their identity, namely an ID. As I was thinking about ways to help them, I started to teach myself about new concepts and technologies related to digital IDs. While I was still a student, I joined the American NGO InternetBar.org, which uses digital technology to support developing countries. We launched a project in Bangladesh to issue IDs for refugees and even did some field testing for it, but we immediately ran into a variety of issues. I became keenly aware of the immaturity

of the technology, and began to delve deeper into the technical side of things.

After graduating from college, I joined a consulting firm while continuing my work with the NGO. I then went to work for Microsoft in the US, where I worked on developing technology for the international standardization of digital IDs using "decentralized identities" (see below for details). In 2024, I moved to an organization within the German government, and am now participating in the creation of a new identity framework for the European Union (EU).

— Was there anything in particular that sparked your interest in the identity issues that refugees face while you were in France?

**Yasuda:** To give you some background, a big part of it had to do with my grandfather being from Crimea. I traveled to Crimea every summer when I was a child to visit my grandfather. It was shortly after the collapse of the Soviet Union, so the roads were in poor shape, and you might only get running water once a week or not at all. Finding out that my beloved grandfather was living in such circumstances taught me that people are living in all sorts of different situations. When I went to college in France, I found myself among students of a great variety of diverse backgrounds. I came to confront my own identity and began to seriously engage with questions related to identity.

#### —What about you, Mr. Fujie?

**Fujie:** I was involved with identification technology as an engineer, already before I joined CTC. It was the early 2000s, when the Internet was still in its infancy. Issues related to ID were not particularly widespread, but there were already questions concerning how to design employee IDs for the proper operation of internal corporate systems. As I worked on developing the technology to meet customer needs, my interest in identity itself grew stronger.

This might relate somewhat to what Ms. Yasuda (Kristina below) spoke about just now, but I lived in Iran and Bahrain in the Middle East when I was a kid. There was a revolution going on in Iran at the time, and war broke out in the Middle East right after we returned to Japan. Some of my friends from the area must have been killed in the war or forced to flee their country, and I think that my becoming aware of such things was what sparked my interest in the concept of identity.

As I became more deeply committed to the technology of identity, I started to get involved in various related communities. That is how I got to know Kristina, and that brings us to the present day.

> Issues Related to Digital IDs That Affect Everyone in Equal Measure

—In recent years, we are constantly hearing about identity theft and data leaks on the Internet. The question of how to protect one's information is therefore something familiar to everyone, and yet, it does not seem that many people understand what digital IDs are. Please explain what they are.

**Yasuda:** To give an example, let's say you're forced to flee your own country and you become a refugee. If you become unable to prove who you are, then you will have lost your identity. This leads to all sorts of difficulties in daily life. If you can't verify your own identity, then you won't be able to open a bank account or get a job. Digital IDs are important in terms of how to solve the problems of such people, and I myself entered this field in response to such issues. However, those are not the only contexts in which digital IDs come up.

A digital ID is something that links a person in the digital realm to the real, physical human being. It is something relevant to everybody living in the modern world. For example, I am now talking to you from Germany via a screen, but there is actually almost no way for you to confirm that this person moving around in the digital world is the same "me" as the physical me who is in Germany. Proving it is also difficult. And that is a problem. If you cannot confirm identities, then there will be bad actors who exploit the situation by stealing identities, and that has actually become a big problem. In other words, establishing safer and more trustworthy digital IDs is something that everyone needs, and the problems that arise with digital IDs are problems that affect everyone equally.

**Fujie:** There is a famous picture called "The Internet Dog" that appeared in the magazine The New Yorker in 1993. The picture suggests that maybe the person you are communicating with over the Internet is actually a dog. In other words, the questions related to digital IDs have remained fundamentally unchanged in 30 years. Not only that, but in recent years, problems of identity theft and data falsification are getting worse and worse. The question of how to establish better digital IDs is therefore an extremely important issue.

When thinking about digital IDs, another important issue is the problem of distinguishing between different types of attributes (i.e., properties and characteristics). Put another way, I' m talking to you now as Naohiro Fujie of CTC, but I don't talk about these things at home, and conversely, when I' m here, I don't talk about what I talk



#### Naohiro Fujie

General Manager, MIRAI Design Laboratory, ITOCHU Techno-Solutions Corporation Chairman, OpenID Foundation Japan

With experience as a consultant and architect for the introduction of global-scale authentication infrastructure, Mr. Fujie has been actively involved in the field of digital identity for over 20 years. Since 2018, he has been working at OpenID Foundation Japan, first as a board member and now as chairman, to promote and raise awareness of digital identity-related technologies such as OpenID and OAuth. He is a task force member of the Trusted Web Promotion Council, co-chair of OpenID Foundation's eKYC & Identity Assurance Work Group, and a member of the Keio Research Institute at SFC.



about at home. Everybody controls their own attributes in this way, depending on the setting and whom they are talking to. People do this subconsciously in the physical world, but it is very difficult in the digital world. For starters, you don't know whom you're talking to. You might also remain somewhere as a copy, and you don't know who's going to see it. In such a situation, another important question related to digital IDs is how to make it possible to control your own attributes.

## Controlling One's Own Information with "Decentralized Identities"

—In considering more credible digital IDs, the concept of decentralized identities is attracting attention, and Ms. Yasuda is continuing to work for their implementation in society. What are decentralized identities?

Yasuda: I just said that it is difficult to confirm whether an individual in the digital world and an individual in the physical world are the same person. The way it works now, the party trying to confirm the information (such as a service provider) contacts the ID issuer (such as the government or credit card company) or works with a platformer (i.e., the tech giants such as Google, Amazon, Meta [Facebook]) that centrally manages the personal information. In other words, the individual concerned does not manage their own personal information. Rather, a third party does so. That type of identification is called a "federated identity."

In contrast, when it comes to decentralized identities, individuals manage the information related to themselves by themselves, only sharing the necessary information to third parties when it is necessary to do so. In English, it's called a "Decentralized Identity" (=DID). As the name suggests, the "decentralized identity" system does not centralize information, so unlike with federated identities, individuals are not dependent on identity issuers or have all their information held by one of the tech giants. It becomes possible for you to control your own information.

The new digital ID framework that is currently being considered is basically being created with decentralized

identity technology. As I mentioned earlier, I have been thinking about how to achieve the international standardization of digital IDs using this information.

**Fujie:** People have long been saying that it is better to have control over one's own data. This idea is called "self-sovereign identity." The technology to transform this idea into a real system has long been immature, but with the advent of Apple Wallet and Google Wallet from the mid-2010s to the 2020s, the concept of a "wallet" has become widespread, where things related to one's identity, such as ID cards and credit cards, are stored in a smartphone and carried around.

On the other hand, it has become common for the big platforms to hold onto personal IDs, collect information such as a person's browsing history, and to use this information for business. This has led to a renewed interest in the importance of being able to control one's own identity. And so, you can say that decentralized identities have started to attract attention regarding both the technology and the social aspect.

Incidentally, people may assume that decentralized identity technology is based on blockchains (i.e., decentralized ledgers, a structure that makes the falsification of data virtually impossible by virtue of the transaction history being managed in multiple places within the network). However, that is not necessarily the case. Indeed, there is now a debate on whether it is truly necessary to use blockchains in decentralized identities. We can't go into detail here, but I would just like to make this point, because it is easily misunderstood.

#### Developing a Framework for IDs That Both the EU and Japan Need Right Now

——I would like to hear about the initiatives that each of you is currently working on, starting with Ms. Yasuda. Could you tell us about the new framework for digital IDs in the EU that you are developing?

**Yasuda:** In 2014, the EU passed a regulation requiring member states to establish digital IDs that can be used universally within the EU (eIDAS). The regulation was

#### Conceptual diagram of the digital ID wallet



The individual stores data on each of their identity documents in a "wallet" in their smartphone. When necessary, they present the identification data as requested by each institution.

amended in 2024 so that all member states were obliged to issue a digital identity wallet, "The EU Digital Identity Wallet (EUDIW)", by November 2026. In addition to the digital ID issued by the state, this wallet utilizes decentralized identity technology to electronically store and use various certificates related to a person's attributes, as well as their driver's license, graduation certificate, etc. The idea is to build a foundation that allows individuals from EU member countries to control their own identities when receiving various services within the EU.

The specific design is left to each country, but it is not easy to make this happen within the two-year time limit. With the large number of stakeholders involved, there are countless issues related to the technology and the framework that need to be resolved. For example, if you use a Dutch wallet at a German hospital, how does the German hospital check whether it is really a Dutch wallet, and how does the Dutch wallet check the credibility of the German hospital? I am busy every day negotiating with EU countries, the European Commission, and companies in Germany, while also writing architecture documents to define the system structure, to solve each of these issues one by one.

-----I am impressed by the EU's advanced initiatives and the speed with which they are being implemented.

Yasuda: In the EU, there are many people for whom moving back and forth between countries is simply part of their daily life, so it is very important and necessary to ensure the reliability of data across national borders. If we can establish a trust framework that has been agreed upon by each country within the EU, and if everyone starts carrying their IDs in standardized wallets, then both safety and convenience will improve, and it will become significantly easier to do business. In particular, the EU is now acutely aware of its need to act as a single economic bloc to compete against the US and China. This is probably also one of the reasons why there is such a strong motivation to standardize digital IDs.

——Since August 2024, CTC has been collaborating with Keio University on a joint research project called "Trust Knots" to explore the future of digital identity. Please give us an overview of it.

**Fujie:** Although we have only just started this initiative, if I had to sum it up in a few words, I would say that the main theme of the research is "exploring how to implement trust."

Now, in contrast to the situation in the EU that Kristina was talking about, Japan has always operated in a way in which everything is completely contained within the country or within a particular industry. Because of this, it simply wasn't necessary to think too much about carrying one's own identity across a border and needing to gain trust, or of reviewing the trustworthiness of someone who had come from outside the border. However, that will no longer be the case. In education, for example, there needs to be an internationally compatible framework that would allow someone educated in Germany to quickly convert their degree to its Japanese equivalent when they come to Japan. In order to make such a framework a credible one, we need to think not only about the technical aspects, but also consider what trust is in the first place, think about how we trust others, and then translate these ideas into code and implement them in the system.

In other words, if we were to create something like the digital ID framework that the EU is trying to create, albeit in Japan, what form could it take, and what technologies would we be lacking? You could say that the point of this joint research project is to explore these questions and develop the necessary concepts.

#### ----So there is a very big theme behind it.

**Fujie:** That's right. We have now developed several use cases to turn our concepts into reality, and are developing and implementing the necessary software, although at the level of field testing. The basic idea is to actually put them into practice and then identify what is still lacking if we want to create a larger framework based on that concept,

and to work out what kind of rules we should establish. I would like to conduct research that contributes to the establishment of a new framework of trust in Japan.

## Tackling the Social Issues of Today with Our Eyes on the Future

— To finish off, please tell us about any challenges you will need to overcome in the future, if any. In addition, how do you expect CTC to deal with the issue of ID in the future?

Yasuda: In terms of the issues, there are many things that need to be resolved in order to bring about the framework that the EU is aiming for. Even once the framework is in place, if it is used and new technologies and services come into play, there will surely be problems that we cannot even imagine yet. The future development of AI will also be relevant. When it comes to the questions surrounding ID, I do not believe there can be any kind of all-encompassing, perfect solution.

**Fujie:** If I were to say one thing about the future of CTC, it would be that as a systems integrator, CTC's top priority is to develop products and services that solve our customers' problems. However, I think it is also important to consider the bigger picture and work toward solving the social issues we currently face. Starting this fiscal year, I have been serving as the general manager of the MIRAI Design Laboratory. At this laboratory, we plan to examine the nature of technology and systems with an eye to the future decades to come, drawing on the expertise of people like Kristina. I would like to think about digital IDs in terms of such time spans as well.

**Yasuda:** Mr. Fujie has been a great help to me from when I started out knowing nothing to where I am today. I hope that we can continue sharing information and holding discussions, both within the formal framework and in the private sphere, so that we can work together to build the new digital ID system.

**Fujie:** Thank you. Addressing today's social issues with an eye to the future is also necessary for CTC to continue operating as a sustainable business. Please continue to lend us your support. azuyoshi Takaichi ergy Business Department ence & Engineering Systems Division erprise Group OCHU Techno-Solutions Corporation

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Special Feature 2

Roundtable Discussion

## **Quest for Decarbonization with CCS**

#### Initiatives in the Science & Engineering Systems Division Aimed at Solving Social Issues

CCS stands for "Carbon dioxide Capture and Storage." It refers to technology that captures emitted carbon dioxide and stores it deep underground. We aim to commercialize it in Japan by 2030 as an initiative geared toward decarbonization. Akita University Professor Shigemi Naganawa who currently chairs the CCS Committee at the Japanese Association for Petroleum Technology joined CTC engineers who are bolstering collaborative efforts to help facilitate commercialization of CCS through IT technology, to discuss the importance of CCS technology and its future outlook. Coverage and text by Yuki Kondo

#### Technologically Feasible, Highly Effective CCS

— In June last year, the Japan Organization for Metals and Energy Security (JOGMEC) initiated the Advanced CCS Projects program with the aim of starting CCS businesses in Japan by 2030. Please share some background behind the current need for CCS which captures emitted CO2 and stores it deep underground.

Naganawa: Japan has set targets of raising the proportion of renewable energy in its electricity mix to 36-38% and lowering the proportion of fossil fuels to 41% by 2030. However, for now, the reality is that we have no choice but to burn fossil fuels, and CO<sub>2</sub> continues to be emitted. CCS addresses these circumstances by capturing CO<sub>2</sub> itself and storing it underground to diminish its impact on climate change as much as possible. It is also a technologically feasible measure that is highly effective. CCS is already being done in other countries, so it should be done in Japan as well. CCS is broadly divided into the three processes of separating and capturing, transporting, and storing. The typical method is liquification through the chemical absorption method using alkaline solution after first separating and capturing CO<sub>2</sub> generated at power plants and factories. When on land, that is then transported to the storage site using a dedicated vehicle such as a tanker truck and sent underground to depths of over 1,000 meters for storage through a well created by drilling. The part with the most points to consider is the final storage process. I got involved in CCS because I had

#### Shigemi Naganawa

Professor of Earth Resource Engineering and Environmental Science Graduate School of International Resource Sciences Akita University

Born in Gifu, Japan in 1965. Graduated from the Department of Resources Development Engineering at the University of Tokyo Faculty of Engineering, then completed a master's program at the same university's Graduate School of Engineering in the Department of Resources Development Engineering. He then served at University of Tokyo as an assistant and then an assistant professor before assuming his current position in January 2018. From April 2019 until March 2021 he served as Director at the International Center for Research and Education on Mineral and Energy Resources, and has been as a professor since July 2021. Doctorate (Engineering). In addition to being a Class II and Class I Information Technology Engineer, he also has Class 4 referee qualification for the Japan Football Association (JFA).



lengthy experience conducting research in important drilling technologies used for that process.

Similarities and Differences Between Oil Exploration, Geothermal Exploration, and CCS

—Professor Naganawa, please share more details about the drilling technology research you were involved in and your relationship with CCS.

Naganawa: The research I conducted was in drilling technologies that dig deep wells for extracting oil and natural gas. When digging wells thousands of meters deep, you run into the problem of how to keep the well from collapsing while you dig. In the case of oil or natural gas, an iron pipe called a casing pipe is inserted inside the well after digging. The space between the pipe and surrounding rock is then filled with cement and fluids are kept from moving around the outside of the well. In conducting research on drilling technologies exclusively for oil, I also began researching geothermal exploration starting a dozen or so years ago, and that was around the same time that I became involved in CCS research. These are both fundamentally the same as drilling technology, but they each have their own characteristics. For oil, the biggest problem is how to contain the pressure on the rock formations surrounding the well in order to drill wells in high-pressure environments. On the other hand, geothermal exploration involves digging down to rock formations at far higher temperatures than for oil. High temperatures in oil exploration reach roughly 200°C, while geothermal gets to around 300°C (400-500°C in supercritical geothermal exploration which drills to even greater depths). In other words, developing technologies for dealing with high temperatures is important.

Then, CCS is characterized by sending CO<sub>2</sub> from the surface into the ground and injecting it into the rock formations, as opposed to oil exploration which takes what is underground and sends it to the surface. Technological development focuses on how to go about keeping CO<sub>2</sub> from leaking.



#### Yuusuke Shimono

Manager Science Systems Development Department Science & Engineering Systems Division Enterprise Group ITOCHU Techno-Solutions Corporation

Joined the company in 2005, and was in charge of software by Landmark. In 2005 he worked to build a geological information system for publishing research findings (AIST), starting in 2007 he was involved in development on an immersive visualization system for subsurface information (AIST), and starting in 2008 he developed a satellite data interpolation algorithm that uses geostatistical methods (NIES). Since 2020 he has accumulated extensive practical experience being involved in many projects that handle resource-related information, including tests to apply machine learning methods to methane hydrate production data.

#### Basic Technologies for CO<sub>2</sub> Storage are Coming Together, but...

is needed to keep CO<sub>2</sub> from leaking?

Naganawa: In terms of the how CO2 goes into the ground, to put it simply, liquified CO<sub>2</sub> is sent underground through the well and injected into crevices between rocks in the rock formations. However, since casing pipes

are secured by cement, they do not touch the rock formations around them as-is. For that reason, equipment that makes holes using a special type of gunpowder must be lowered into the well to open multiple holes after the casing pipe is secured. In some cases, pipes that already have holes or slits are lowered in, and CO<sub>2</sub> is injected into the geological formations through those holes.

As for how CO<sub>2</sub> injected into geological

formations in this manner can leak, one way is that the well itself can be the leakage route. The well is closed after CO<sub>2</sub> has been injected, but when CO<sub>2</sub> dissolves into water in the surrounding rock formations, it turns into a corrosive fluid. When this happens, it corrodes the casing pipe and the cement around it, and CO<sub>2</sub> can then leak. Cement with CO<sub>2</sub>-resistant properties could therefore be a potential solution, but this is a difficult technology to work with. Aside from that, other challenges are how to tightly fill the cement and how to securely refill the well after storage is complete.

-Japan aims to have 120-240 million tons of CO<sub>2</sub> stored in 2050. This amounts to around 10-20% of Japan's CO2 emissions in recent years. Does it seem possible?

Naganawa: Japan's R&D on CCS is primarily conducted by the Research Institute of Innovative Technology for



Adapted from the Agency for Natural Resources and Energy "CCS Steps" (https://www.enecho.meti.go.jp/ab the Earth (RITE), and they have already reached the implementation stage in technologies for drilling itself. Japan's first ever large-scale field test in Tomakomai starting in 2016 has achieved successful results.

However, costs must be reduced in order to reach commercialization, which requires further R&D. There is also the problem of selecting storage sites. The list of marine areas suitable for storage has been narrowed down, but when launching actual business efforts you need to get people in those communities to understand. People are concerned about the risk of CO<sub>2</sub> leakage. Solutions to those risks are still a work in progress.

#### Applying IT Technologies Honed in Oil Exploration and Resources Fields to CCS

## —How have those of you from CTC been involved with CCS?

Shimono: Starting from when I joined the company, I was involved in software sales and development for oil exploration-related technologies. After that I worked in other fields, then returned to the field of resources last October and am now in charge of CCS. I also participate in the CCS Committee chaired by Professor Naganawa at the Japanese Association for Petroleum Technology and I conduct research and interviews geared toward CTC also contributing to commercialization of CCS.

**Sakaguchi:** I was in charge of maintenance and analysis operations for software by Landmark, which is widely used in the resources field. After that I worked on JOGMEC's Domestic

#### Hironori Sakaguchi

Supervisor Science Systems Development Department Science & Engineering Systems Division Enterprise Group ITOCHU Techno-Solutions Corporation

Joined the company in 2009. In charge of technical support for Landmark's ProMAX/SeisSpace® seismic reflection survey data processing software. From 2011 to 2019 he handled three-dimensional (3D) seismic reflection survey processing for the Domestic Oil and Gas Basic Survey project. In 2019, he participated in Research and Development of Small-Scale Geothermal Smart Power Generation & Heat Supply by Applying IoT-AI, research contracted from NEDO, and more. Since 2020 he was been involved in developing workflows for automatic detection of BSR in research contracted from JOGMEC.



Oil and Gas Basic Survey project from 2011 to 2019. During that time, I participated in projects to explore locations of oil and natural gas reserves, and performed analyses to identify subsurface structures based on 3D data obtained via sonar. That technology is also useful in finding locations suitable for CO<sub>2</sub> storage. Since returning to CTC in 2019 and taking on a role in the resources and energy fields, I have had more opportunities to be involved with CCS since last year.

Takaichi: I joined the company in 1986. That was around when Sunshine Project geothermal exploration project was thriving, and I was in charge of analyzing and processing data obtained from measurement companies. I' ve been involved in work related to that since then. As for CCS, I plan to be involved in aspects such as data analysis.

Incidentally, we began carrying the previous Landmark software in 1995, and Professor Naganawa has been using it since 2013. I understand that you have been using software from ITASCA since even before that. **Naganawa:** Correct. Landmark's software has been in regular use by pretty much every oil company for simulating oil wells and drilling, and for designing oil wells since around the late 1990s. Since CCS is also quite similar to oil exploration technologically, this software is useful for it.

#### The Importance of Simulations, Data Analysis, and Visualization

—Could you explain what type of role IT plays in the fields of oil exploration and CCS? What are the characteristics compared to other fields?

Sakaguchi: I think one of the characteristics of this field is the importance of data. What is underground cannot be seen and is not easy to dig or drill. That is why obtained data is so valuable. The data is also highly confidential since it pertains to national land. I think that IT experts with extensive experience handling data are needed in this field. Naganawa: In addition to not being visible, exploration underground is also



#### Kazuyoshi Takaichi

Energy Business Department Science & Engineering Systems Division Enterprise Group ITOCHU Techno-Solutions Corporation

Joined the company in 1986. He was put in charge of software by Landmark in 1995. He was involved in detailed considerations and NEDO contracted research for innovative monitoring and simulation technologies for basic oceanographic information management devices in 2016 and supercritical geothermal power locations in 2017. He has performed technical work in an extensive list of research efforts and projects, including participation in Geothermal Database System development in 2018 and Research and Development of Small-Scale Geothermal Smart Power Generation & Heat Supply by Applying IoT-Al in 2019, and research contracted from NEDO.

a struggle in and of itself. There is a limit to how much data can be obtained. Even if you want to know about a vast area of land where CO<sub>2</sub> can be stored (reservoir), you cannot see the bigger picture simply by drilling several wells and gathering the data. That is why it is important to use simulations to understand the behavior of CO<sub>2</sub> in the reservoir. For the wells themselves, simulations are also essential in choosing materials for the casing pipe and cement, and in considering the optimal operating conditions.

Takaichi: Large amounts of data must be gathered, processed, and analyzed since there is so much uncertainty underground. Thus, you could say that large volume of data is another characteristic.

Regarding the selection of storage sites, earlier you mentioned that some local residents voice concerns about problems such as CO<sub>2</sub> leakage. What are the risks that people are concerned about? And what type of role could IT potentially play in addressing those? **Naganawa:** We are still in the stages of research and discussions regarding the risk of CO<sub>2</sub> leakage. Some researchers also think that marine life could be impacted if CO<sub>2</sub> levels in the water increase due to leakage. On the other hand, CO<sub>2</sub> is not a type of substance that causes any immediate health hazards to humans.

In 2010, there was a crude oil spill accident during drilling operations in an offshore oil field in the Gulf of Mexico. Oil that leaked from one well caused massive environmental damage. Some people have the same concerns about CO<sub>2</sub> leakage, but the types of risks are definitely different from those of oil. However, there probably aren't any people who can explain that based on sufficient evidence. People on the "business side" like myself first need to accurately understand that, and then be able to indicate in a convincing manner that there are no risks of something like an oil spill, but there could be a certain level of risk. Data and IT will be particularly important for such efforts.

Shimono: We can simulate how much

CO<sub>2</sub> will dissolve into the seawater, how much acidity will rise, and what impacts there could be on ocean life. Visualization technologies delivered through VR and AR could also be among the useful ways to help people to sufficiently understand those results and impacts. I believe that we can contribute in these usages of IT technologies.

#### The Seal Layers Problem Requiring Future Consideration

— Professor Naganawa, in the roadmap toward starting CCS businesses in 2030, what has been the focus of your research?

Naganawa: For CO<sub>2</sub> leakage, there is another possibility that must be considered aside from potential leakage through the well. That is the seal formation (shielding formation). There is a formation of tight clay that oil and CO<sub>2</sub> cannot penetrate above layers containing oil and rock layers where CO<sub>2</sub> is stored. This layer acts as a seal. This is thought to prevent stored CO<sub>2</sub> from leaking up to the surface, but I doubt it has been fully clarified whether the strength of the seal formation is able to withstand higher pressures if large volumes of CO<sub>2</sub> are injected underneath.

In terms of geomechanics, this is an issue in how underground formations deform when a certain force is applied to them, which is one of my fields of expertise. Being an expert in the field, I feel a strong need to resolve this. Simulations must be run to determine what volumes of CO<sub>2</sub> can be injected without the seal formation rupturing.

-----Could the results of such simulations show that potential storage volumes are less than we currently anticipate?

**Naganawa:** I believe so. Once we clarify problems with the seal formation, we should have a clearer idea of the maximum volumes of CO<sub>2</sub> that can be stored. We are also taking that into consideration in current simulations, but the current models are still insufficient. Injection speed could also be a factor in whether or not the seal formation ruptures, which could impact the operational conditions when injecting and storing CO<sub>2</sub>.

#### Higher-Transparency Technology and Business Through the Power of IT

## ——How will you and CTC be working together in CCS going forward?

**Naganawa:** The CCS Committee which I have chaired since June of last year brings together experts in related fields such as exploration, drilling, storage, separation and capture, transport, IT, and law. CTC is among those experts in the IT field. IT is highly important in CCS, so I hope to have more vigorous dialogues in that regard.

Shimono: I think that activities in the CCS Committee will soon get into full swing. We look forward to contributing as much as we can while engaging in dialogue with Professor Naganawa in areas where solutions require the use of IT.

**Sakaguchi:** If possible, I would like to have the opportunity to visit the actual sites, listen directly to what types of conversations are happening there, and utilize IT based on what I hear.

Takaichi: One point specifically is that

people from many different fields are involved in CCS, so it would be better to have a platform to comprehensively share their respective data and utilize it effectively. That is one of our strengths in the Science & Engineering Systems Division, so I hope we can be of service.

—To conclude, could we ask you to reiterate your messages to society, from both Professor Naganawa who will be supporting CCS academically, and from CTC which aims to contribute to the commercialization of CCS through IT.

**Naganawa:** I have said this before, but as a practical matter we cannot maintain our lives without continuing to burn fossil fuels to a certain extent, at least for now. Taking that into consideration, CCS is currently the most feasible and effective way to mitigate the impact of CO<sub>2</sub> emissions. As a researcher, I consider it my responsibility to explain the advantages, disadvantages, and as much other information as I can in a way that is easy to understand. On top of that, I also absolutely want to have discussions with people in the general public about how things can be done.

**Shimono:** As we face the need to transition toward a decarbonized society as quickly as possible, I feel there is much that CTC can contribute as a group of IT experts. Playing a role in the commercialization of CCS is an important part of that. Please stay tuned to what's happening in the CCS movement.



This article is excerpted from the Best Engine online article published on March 8, 2024. (Job titles and department names listed are current as of March 2024)



The full article is available here (in Japanese only) > https://www.ctc-g.co.jp/bestengine/article/2024/0308a\_01.html

## **Technical Report**

## Uncovering Advanced AI Technology Working in Business Partnerships for Social Implementation

Since the arrival of ChatGPT, AI technology has evolved at an astounding pace. People believe that it could potentially bring about new effects in a variety of fields. Here we will explain AI technology trends in North American R&D and share one of our initiatives in the development of AI solutions with US company Liquid AI, a startup spun off from MIT.



Tomohiro Igarashi (pictured at left) Deputy General Manager Open Innovation Promotion Department

Managed Services Planning and Promotion Division ITOCHU Techno-Solutions Corporation Atsuhiro Aiyama (pictured at right) Director Business Development

ITOCHU Techno-Solutions America, Inc.

### Silicon Valley, the Holy Land for Advanced Technology

Silicon Valley, the central hub of the technology industry, continues to be an environment where the world's top talent at exploring advanced technologies with eyes on the bigger picture comes together and makes each other better through friendly competition. It also has ecosystems in place to raise funding from well-known venture capitalists (VCs) who support top talent. This helps to mold Silicon Valley's unique culture of always being at the forefront of digital innovation.

### Connecting Silicon Valley Startups with the Japanese Market

Since the 1980s, CTC has been engaged in market research on the latest technologies, uncovering new products and services while working in partnerships primarily North America, and accumulating advanced technologies and expertise in the process. Leveraging our capacity for discernment cultivated over the years, our strength lies in connecting and combining cutting-edge technologies to offer the optimal solutions for the challenges our customers face. In addition to our business models employed thus far, we also targeted further growth in enterprise value by beginning a North America Partnership Program (NAPP) initiative in April 2023 through collaboration between our US business arm ITOCHU Techno-Solutions America, Inc. and non-Japanese VCs to co-create new business with the aim of strengthening our intellectual capital. We are working to pioneer new business fields through early-stage co-creation together with startups who are striving to develop new businesses that leverage technology.

#### AI as the Key to Business Growth

The trends in Silicon Valley change at a blinding pace. Several years ago when the SDGs were being instilled, companies were actively promoting their initiatives for products and solutions that are good for the environment and society as well as their stances toward contributing to a sustainable society. This movement changed dramatically in November 2022 when OpenAI launched ChatGPT. Since then, it seems the SDGs trend in Silicon Valley has been replaced by AI. Large IT companies decided to engage in Al-centered business to boost their competitiveness, while startups did the same in order to raise funds and move forward to their next funding rounds. The past year or so in particular has seen a sudden spike in cases of companies that had no direct relationships with Al working on Al business and using Al as a keyword on their websites.

On the other hand, when looking at AI from the technological perspective, generative AI is gradually playing a larger role in our lives because it is increasingly easy to use and accurate. Word is spreading that artificial general intelligence (AGI) with even higher performance and with intelligence equivalent to humans will arrive in five or six years. Once AGI becomes prevalent, people expect development to move forward on artificial super intelligence (ASI) that far surpasses human capabilities. Eventually, AIs might be able to learn from each other without human interaction, advancing the technology even further. In Silicon Valley, these AI technology trends are expected to continue at least through 2030. AI could become a normal and indispensable part of our lives.



#### Stock price movements: test data prediction results

Compared to the prediction accuracy of other models such as RNN and MLP, LNN has shown to be more accurate and with good tracking capability since it has the characteristic of readily comprehending long-term trends and variations according to past data.

#### Co-creation with Liquid AI

CTC has been active in AI business for many years, currently providing various services and solutions with advanced AI as an area of focus. In an initiative through NAPP, we are working in collaboration with startup Liquid AI, Inc. which was founded as a Massachusetts Institute of Technology (MIT) spinoff. Liquid AI is a company established only recently in 2023 which CTC never would have known about without an introduction from a VC working on NAPP collaboration. They had no website at the time of the introduction.

CTC and Liquid AI have been conducting repeated verifications to create new AI solutions utilizing Liquid AI original technology based on liquid neural networks (LNNs) which its founders developed at MIT. LNNs are a method that enables highly adaptable machine learning with minimal processing power using models of neural networks that mimic the neural circuits in the brain of a small nematode. Nematodes have the characteristics of (1) very simple brain structures with few nerve cells, and (2) flexibility in adapting to the outside environment. Developed to utilize these characteristics of the nematode, LNNs are also capable of learning more flexibly than conventional models, even in unfamiliar environments that diverge from the data they were trained with, and in unexpected situations. Another characteristic is that they can carry out complex computations with minimal processing power, as opposed to AI systems until now which have required massive computation costs.

For example, LNNs can perform the computations for autonomous driving which require around 100,000 neurons in typical machine learning models using only 19 neurons, while achieving the same level of results. Since they are run on edge devices and small computers installed close to users, they can also reduce the size of AI system infrastructure which had conventionally required massive computation costs, potentially reducing both power consumption and CO<sub>2</sub> emissions.

One example of CTC and Liquid AI's verification results was when next-day stock closing prices were predicted based on the past four years of Nikkei Stock Average data. Prediction tracking capability tended to be far higher with LNNs than

with existing models when stock prices moved significantly due to factors such as company performance and weather. Judging from a number of other verification results as well, we believe LNN algorithms can achieve more accurate predictions in realtime compared to the conventional models. They show tremendous potential in a wide variety of settings for predictions according to situational changes over time, including autonomous driving of drones and vehicles, detecting abnormalities at factories, and even in finance and healthcare.

LNNs were academically acknowledged and gained international recognition in December 2023. They will likely be an increasing focus of attention. CTC and Liquid AI will be conducting even more verifications and exploring optimal usage methods.

#### Future Outlook

Leveraging more than three decades of experience in Silicon Valley, CTC will create new solutions and contribute to customers' businesses through collaborations with VCs and high quality startups.

## I&B Consulting Supports Customers' Entire DX Process from Strategy Formulation and Concept Design to Implementation Support

Joint venture I&B Consulting was established in April 2024 by ITOCHU Corporation, which grows the value chains that support customers' DX, with one of the world's leading strategic consulting firms Boston Consulting Group (BCG). Working together with CTC and other ITOCHU digital business alliance partners, ITOCHU Corporation will be leveraging BCG's knowledge in global strategy formulation to provide DX consulting services that deliver highly implementable solutions.

#### Changes in Environments Surrounding IT Departments and ITOCHU Corporation's Initiatives

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Leveraging IT and digital technologies for business transformation and overcoming business challenges is becoming increasingly important for companies. Information systems departments must also now manage beyond the scope of internal IT systems to work collaboratively with business settings. To accommodate these changes and provide services tailored to customers' sophisticated and complex needs, ITOCHU Corporation has established an extensive digital value chain from upstream functions such as data analysis, CX design, and marketing, to downstream functions such as IT services and BPO.

Through the establishment of I&B Consulting, a joint venture with BCG, ITOCHU Corporation has also bolstered its organization to comprehensively support customers' business transformation by providing strategic consulting that serves as a starting point for corporate transformation.

#### Collaboration Between BCG and ITOCHU Corporation

BCG has done business in Japan longer than any other foreign-owned strategic consulting firm. With locations in more than 50 countries around the world, they have been supporting the formulation of business strategies in various industries globally from manufacturing and healthcare to finance, energy, and more. In recent years they have been providing consulting services that leverage design, data, and technology to produce "DigitalBCG" which solves problems in companies and society while organically integrating strategy with DX. ITOCHU Corporation and BCG have been building mutual understanding and trust through roughly 10 years of business together sharing customers' values. BCG owns an extensive range of case studies in strategy formulation, while ITOCHU Corporation operates a broad range of businesses primarily in consumer goods. Working together will make it possible to provide unprecedented new value.





#### Company Overview

Company name: I&B Consulting Inc. Established: April 2024 Headquarters: 22F Shiroyama Trust Tower, 4-3-1 Toranomon, Minato-ku, Tokyo 105-6022 Business description: Business consulting & DX consulting



#### Tasuku Yamazaki

President & CEO I&B Consulting Inc.

#### Characteristics of I&B Consulting

I&B Consulting provides all-encompassing support to make customers' DX successful, from strategy formulation to implementation. Integrating BCG's strategic consulting with the system architecture and operations experience of ITOCHU's digital business alliances, I&B Consulting will take a panoramic view of customers' entire businesses while formulating the optimal DX strategies for them. Through alliances with CTC and other diverse partners, I&B will also develop systems flexibly to support organizational and operational transformations according to customer needs, saving customers the trouble of coordinating with multiple vendors while enabling their swift, smooth digital transformations.

#### Common Pitfalls in Large-Scale System Implementations

Unable to utilize it properly and business impact was limite

With the threat of Japan's "2025 Digital Cliff" looming, many companies are dedicating efforts to implementing large-scale systems such as ERP. However, contrary to their expectations, cases of system implementations ending in failure have continued unabated. Survey results have also shown that roughly 80% of large-scale system implementation projects have failed to meet the quality, budget, or timelines that were initially planned. This has become a major common business challenge among Japanese companies in recent years. Why are so many companies struggling with large-scale system implementations? This can be attributed to the business issues of divergence between management/business agendas and IT and of insufficient large-scale system implementation experience which Japanese companies have been dealing with over the past 10 to 20 years. To break out of this rut, we will need to understand the common pitfalls for companies and pinpoint the keys to success. I&B Consulting provides support to minimize risks and generate greater business impact according to a customer's system implementation stage, from the time of large-scale systems considerations through resolution of issues that arise post-implementation.

Visualized the big picture & priority levels for the business transformation agenda and DX measures supporting it



## **Global Report**

### Experience in Taiwan and Japan Leveraged to Solve Social Issues Initiatives at the CTC Taiwan Representative Office



#### Masahiro Yonezawa General Manager of Taiwan Representative Office ITOCHU Techno-Solutions Corporation

Promoted a collaboration with Intumit, a Taiwanese AI provider startup and launched the service in 2019. He previously worked as a DX advisor for local government, accompanying support for an EBPM\* project, and as an instructor for organizational transformation workshops among other roles before assuming his current position in April 2024.

## Taiwan Representative Office Established to Accelerate Collaborations

Taiwan is home to many manufacturers of digital components such as semiconductors and sensors, technologies which are used by major IT companies around the world. CTC's connections with Taiwan span many years, and CTC has also been carrying network products from Taiwanese vendors since the 1990s. Parts made in Taiwan are also used in the open source hardware specifications called the Open Compute Project (OCP) advocated by Facebook (now called "Meta") for which CTC is a licensed solution provider.

Since 2019, we have been partnering with Taiwanese AI and robotics startup Intumit to provide AI chatbot services for local government agencies in Japan.

With efforts such as those ongoing, we opened our Taiwan Representative Office in Taipei, Taiwan in September 2023 to accelerate research and partnerships in advanced technologies in Taiwan.

#### **Robust Support for Startups**

Taiwan's Government is also actively and vigorously supporting the growth strategies of startups through government-run organizations, the Industrial Technology Research Institute (ITRI), and the Taiwan-Japan Industry Center run by the Institute for Information Industry (III). The Taiwan-Japan Industry Center not only organizes events and provides business matching with Japanese companies, its mission is also to make startups successful in Japan. In ongoing discussions that CTC has had with many startups through introductions by the Taiwan-Japan Industry Center, there have been many companies seeking business partnerships in the Japanese market who are also advancing to the phases of further technological verifications and considerations of specific initiatives.

#### Participation in the Smart City Project of Tainan

In field testing for the Smart City Project in the city of Tainan, Taiwan which ITOCHU Taiwan is working on as project owner, CTC is involved in MaaS for smart transportation.

#### Overview of Smart City Project of Tainan

Under the concept of smart energy, smart environment and smart transportation, the project will leverage IoT, AI, and other cutting-edge technologies to energize urban functionalities and deploy eco-friendly urban planning, including efforts such as visualizing energy, analyzing people flow, and smart distribution.

Smart energy	Constructing an energy management platform Green energy supply & demand forecasting Power consumption analysis for specific areas	
Smart environment	People flow analysis, developing a traffic rule monitoring system	
Smart transportation	Constructing algorithms for traffic lights using AI technologies Implementing MaaS technologies	

CTC has been involved in field testing in MaaS to solve public transportation problems that local governments in Japan are dealing with. This involves enabling efficient transport with a limited number of vehicles by setting transportation routes through the use of AI and providing on-demand transit. Taiwan and Japan are both dealing with the common social issue of aging populations, but Taiwan has established the position of bringing the private and public sectors together to solve problems through IT, putting them ahead of Japan in the field of urban development. While leveraging expertise honed in Japan for this project in the city of Tainan, CTC also hopes to utilize new knowledge gained from projects in Taiwan for the development of MaaS in Japan.

Mutual exchange of culture and knowledge, sharing of case examples and issues, and sales channels for solutions have now been firmly established between Japan and Taiwan. With these two locations as a starting point, we will be engaging in more projects and business between them while looking to further expand sales channels, including in CTC's other global business locations (the US and ASEAN).

## News Pickup

## Here is information on solutions and services featured in CTC news releases.

#### SDGs x Innovation

#### Collaboration with LIFULL Agri Loop to Realize a Recycling-oriented Society

We launched a collaboration with LIFULL Agri Loop which offers a fertilizer catalyst called "Poop Loop" that can convert livestock manure into fertilizer and improve soil quality while suppressing foul odors and greenhouse gases, aiming to help realize a recycling-oriented society. CTC will measure and visualize the foul-smelling gases and GHG emissions from pastures where livestock manure made into fertilizer has been applied, verify the effects of Poop Loop, and conduct analyses and testing geared toward carbon credit trading. In addition, we will measure and analyze the chlorophyll content of pasture grass to predict the best time to harvest high quality grass with high sugar content.

#### SDGs x AI

#### Providing the StateEco Resource Recycling Platform for Waste Treatment Visualization

We began providing a resource recycling platform called StateEco which visualizes waste treatment status and CO<sub>2</sub> emissions during transport. The platform links data between business operators and improves operational efficiency in areas such as emissions, collection and transport, and intermediate treatment. Doing so, it promotes proper waste treatment, recycling of raw materials, and reduces costs by coordinating drivers and transport routes for joint deliveries by transport business operators and other means. We will be bolstering its functionality going forward, including route optimization through AI and compiling reports that lead to information disclosures.

#### DX x CRM / Contact Centers x Operational Efficience

#### Launched Zoom Contact Center, a Contact Center Solution from Zoom

CTCSP which offers IT-related devices and software began providing a contact center solution from Zoom called Zoom Contact Center. This solution improves customer satisfaction and makes contact center operations more efficient through conversations between operators and customers via video chat in addition to telephone, chat functions, and email. CTCSP will be providing comprehensive support, including for system migrations and operations, and for linkage with existing systems.

#### DX x Security x Global

#### Invested in US VC Forgepoint Capital's Fund III in Cybersecurity

We invested in the fund established and managed by US venture capital (VC) firm Forgepoint Capital for the purpose of bolstering our offerings in advanced solutions in the cybersecurity field. In order to meet growing needs for cybersecurity, CTC will collaborate with startups through this fund. In CTC' s Cyber Security Lab environment for verification through combinations of multiple security products and services, we will verify the advanced technologies of the startups to offer solutions that contribute to the protection and stable operations of systems.

#### DX x HR Development x BI / DWH

#### Launched DatactiX Educational Service for Data Utilization

We began providing an educational service for companies called DatactiX which teaches basic knowledge on data management and how to use data through a card game and group work format. Users choose cards showing problems in data management and ways to solve them while engaging in role plays of scenarios in management teams, information systems departments, and business departments to acquire knowledge about data management in a balanced manner. We are considering working together with member financial institutions of the Financial Data Utilizing Association (FDUA) and will be adding even more content

#### AI x Cloud

#### Build Generative AI Usage Environments in as Little as Two Weeks

We began providing Azure Open AI Service Quickstart Package which builds usage environments in short time frames for Microsoft's Azure Open AI Service generative AI cloud service. This is a package dedicated to swift service usage which can build generative AI environments in as little as two weeks. CTC handles Q&A related to the build and specifications of generative AI environments as the usage procedures for Azure OpenAl Service. It can be used safely, avoiding risk of confidential information leakages, in customer-exclusive secure closed environments.

Please visit the link below for further details (Japanese only).

Golf Digest Editorial Yuko Moriguchi Talks About Women' s Professional Golf in Japan Today

## The Strength and Driving Force of Japan's "Generation Z" Professional Women Golfers That Is Taking on The World

"Generation Z" refers to the generation born after the late 1990s. In Japan's professional women's golf, there are the "golden generation" born in 1998, the "platinum generation" born in 2000, and the "diamond generation" born in 2003. And every year, outstanding talents such as Mone Inami, Yuka Saso, Miyuu Yamashita, and the Iwai sisters appear one after another to fill the gap between these generations. What is behind all this?

We asked Yuko Moriguchi, a pro with 41 wins on the Japan Ladies Professional Golfers' Association (JLPGA) Tour and currently active as a golf commentator, about the mindset of the Generation Z players, and what supports their strength.

#### Influence from Admired Players, and a System That Provides Excellent Development and Back-Up

—Japanese professional women golfers, especially the young players known as Generation Z, have been very successful on the global stage. What's driving their success?

**Moriguchi:** I believe a major factor is the enhancement of "junior lessons" throughout Japan, which the JLPGA has been especially emphasizing since the beginning of the 2000s. Back then, Ai Miyazato was very successful, which caused more and more children to think, "I also want to play golf like Ai." So the timing of the framework to accommodate young players matched perfectly with that growing interest. In our next-door neighbor South Korea, many players who started golf after seeing Se Ri Pak win the U.S. Women's Open since became successful. I believe a similar thing is happening in Japan.

Also, we must not forget the impact of the Japan Golf Association's (JGA) efforts to strengthen the national team. It was 2015 when Gareth Jones was brought in to coach the national team, and many of the players who have been with the team have since been successful as professionals.

Jones was quick to introduce team members to cutting-edge practices that everyone on the world's professional tour was implementing, such as the use of ballistic measuring instruments in practice and incorporating the concept



Hinako Shibuno (25), born in 1998. Won the AIG Women's British Open in 2019, becoming the first Japanese player t o w in a major tournament in 42 years. She stunned and excited Japanese fans. of "statistics" into course strategy. I believe that players shared this experience between generations, and more players developed the ability to think for themselves and improve their skills after becoming professionals.

The "Sakata Juku," which was headed by the late Nobuhiro Sakata, involved in efforts to accept schoolgirls to train them to the professional level, and produced Miho Koga, Momoko Ueda, and others, also made a very significant achievement that greatly expanded the opportunities for women golfers.

#### Rivals and Colleagues Who Empower Each Other and Celebrate their Successes

—Generation Z is generally said to have a distinct mentality which is different from earlier generations. What are the characteristics of Generation Z professional women golfers?

**Moriguchi:** When I look at the players in the "golden generation" and "platinum generation," of course they are strong as individuals, but I feel Generation Z players have a strength as a generation.

### Yuko Moriguchi

Joined JLPGA in 1975, with her first win in 1978 at the World Ladies. Has consistently racked up wins, including the JLPGA Championship, with a total of 41 titles. Has permanent seeding rights on the JLPGA Tour. Was inducted into the Japan Professional Golf Hall of Fame in 2019.



For instance, if someone in their same generation wins a title, many of them feel as happy as if it was their own victory. In my case, if someone else won my first reaction would be disappointment. But it's really admirable that that Generation Z players can celebrate their colleagues' victory from the heart, and I believe that is also the driving force to enhance each other. Since they have known each other and have engaged in healthy competition from their junior days, they can naturally act as rivals during play, and at the same time respect each other as colleagues of the same generation after the game is over.

In this context, I feel that the events such as Hinako Shibuno's victory at the Women's British Open (2019) and Mone Inami's silver medal at the Tokyo Olympics (2021) have really been an inspiration. In Japan, Hina Arakaki was the first of the golden generation to win as a professional (Minami Katsu had previously won as an amateur), and from there, players of the same generation won one after another, probably because everyone truly thought, "I can do it too."

In the same way, to win a major world title was somewhat of a "distant goal," until Shibuno's victory suddenly made it a closer goal. Undoubtedly, this is what became the driving force for Yuka Saso and Ayaka Furue becoming major champions, and I believe there will be more Japanese players winning major titles.

#### Creating an Ideal Environment Utilizing Cutting-Edge Equipment

— Generation Z seems to be efficiency-oriented with an emphasis on time versus performance, have a flexible mindset and good at bringing creative ideas to work, but what about in the world of professional golf?

**Moriguchi:** I think it is unique to Generation Z to use ballistic measurement instruments to improve the efficiency of practice and to utilize videos as the norm. For example, Miyuu Yamashita was very early in purchasing and implementing the "Trackman\*," and Sakura Koiwai would study swings on online video, and would have the impressive footwork to approach and learn from a coach (Naoki Yoshida) who inspired her.



Ayaka Furue (24), born in 2000. Won the Fujitsu Ladies Golf Tournament in 2019 as an amateur. First win as a pro in 2020. Won her first overseas title in 2022 at the ISPS HANDA Women's Scottish Open.



Sakura Koiwai (26), born in 1998. After winning her first tour in 2019, has consistently won every year, currently with 11 titles.

Lately, more players are relying on specialists in the areas of swing, fitness, diet, and mental health, and working as a team. This is also a characteristic of Generation Z which emphasizes efficiency.

Generation Z players work to improve each other with colleagues who are also rivals, and actively introduce things which appeal to them. My generation did not have this type of thinking when we were young, and Generation Z has the foundation to do this. They are not afraid to compete in overseas and major tournaments. This trend will be passed on to future generations, and there is no doubt that the young generation of Japan will be successful in the global stage.

<sup>\*</sup>A ballistic measurement instrument. Measures the initial speed, launch angle, and spin rate of the ball. It tracks the ball with radar, and displays the distance, trajectory (hook, slice, high/low), etc.

## CTC Sustainability Progress

For a Sustainable Future

## Supporting Systemization and the Streamlining of Operations to Promote Carbon Neutrality and the Green Transformation

Introducing the "GX Advisory Service Starter Pack," a response to the concerns and requests we receive from customers who are pursuing sustainability and the Green Transformation (GX).

#### Supporting Customers by Lowering the Hurdles to Promoting Sustainability and GX

If we are to address the myriad issues brought about by global warming, then the early disclosure of non-financial information-greenhouse gases (GHG) in particular-and third-party assurance are necessary. Companies must urgently improve the operational efficiency and systematization of the calculation of GHG emissions from their own operations and supply chains.

on the frontlines of promoting sustainability GX, CTC has launched the "GX Advisory Service Starter Pack." Some customers may find themselves lost, not knowing what step to take next, or they may want to start small by gaining an understanding of the actual situation before they obtain a budget. As a first step, we aim to produce definite results so that we can meet such customers halfway.

By combining over 50 years of "IT skills" and "scientific knowledge," CTC will help both our customers and society to achieve carbon neutrality.

In order to provide solutions and support for issues arising

#### GX Advisory Service Starter Pack Service Menu

On the basis of current formats and

supported information disclosure standards.

we will perform diagnoses of the status of

data collection and systemization.



Based on the various usage data currently available, we will perform diagnoses aimed at identifying the perspectives and systems required for the automation and utilization of CFP calculations.

#### Developing GX human resources

#### Supporting the development of GX human resources

Providing training based on the training and other programs we have provided to the approximately 16,000 employees of the CTC Group, but tailored to suit customer needs.

\*1 CFP: Carbon footprint

#### 2050 CTC Group Environmental Declaration (reference year: FY2022)

Short-term targets	- Scopes 1 and 2: 50% reduction by FY2030 - Scope 3: 25% reduction by FY2030	SCIENCE BASED
Long-term targets	- Scopes 1 and 2: 90% reduction by FY2040 - Achieve net zero emissions by 2050 (Scope 1, 2, 3) <sup>*2</sup>	
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\*2 Net zero means reducing total Scope 1, 2, and 3 emissions by 90% or more, and neutralizing the remaining emissions by investing in absorption/storage solutions. (90% reduction of Scope 3 emissions should be achieved by 2050.)



## information

#### We Revised the CTC Group Corporate Philosophy

With an eye on even more growth in the future, we revised the CTC Group Corporate Philosophy as of August 1, 2024. The new group corporate philosophy aims to paint a clearer picture of the origin of our brand name "Challenging Tomorrow's Changes," with a simple structure that expresses the challenge-seeking attitude of the CTC Group which stands at the forefront of global changes.

Visual representation of the CTC Group Corporate Philosophy



Picturing the world as a formation of dots in 20 different colors, the diversity of the CTC Group and its challenge-seeking attitude visually overlap with the world which is changing in diverse ways.

Please visit here for further details. https://www.ctc-g.co.jp/en/company/about/philosophy/



麻布

#### **CTC Hinari Opens Cafe** in Azabu Regional City Office in Minato City

CTC HINARI (often just called "HINARI") which promotes CTC's employment of people with disabilities opened HINARI CAFE Azabu in the Azabu Regional City Office in Minato City on September 12,



2024. Through this cafe, we aim to facilitate interaction with the local community while creating and further improving job satisfaction for employees with disabilities. Hinari offers its own original coffee as well as box lunches made with fresh locally-sourced vegetables.

#### About HINARI CAFE Azabu

Name: HINARI CAFE Azabu

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CTC Technology Corporation (CTCT) Kamiyacho Trust Tower, 4-1-1 Toranomon, Minato-ku, Tokyo https://www.ctct.co.jp/en/

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#### CTCSP Corporation (CTCSP)

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