Best Engine

Vol. 7

Special Feature

What We Can Do Now for a Sustainable World

"SDGs Team" Yoshimoto Kogyo Co., Ltd.

ITOCHU Techno-Solutions Corporation

Best Engine

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Cover photo by
Masataka Nakano

CTC Technology's Shinkiba Logistics Center handles the delivery and restocking of parts, including maintenance parts, as well as quality control through good-quality inspections. It backs up maintenance support services in eastern Japan and the Kanto region.

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The Four Seasons of IT

Efflorescence

While on a walk the other day, I noticed, when observing a cherry blossom tree near my house, the clear presence of small buds. I cannot help myself from feeling impressed that at around this time every year, they unfailingly begin making preparations for blooming.

The growth of cherry blossom buds is affected by the daily changes in temperature from around the first day of spring (according to the lunar calendar) up to around the spring equinox. According to an oral tradition, cherry blossoms bloom when the total sum of the daily temperature readings, starting from the first day of spring, reaches 540. I tried this out a few years ago, adding each day's temperature, and it was about right. Adding the day's temperature and waiting for the cherry blossoms to bloom can be an enjoyable way to spend spring.

In Tokyo, cherry blossoms usually reach full bloom at around the time that the new fiscal and academic year beings. Although there are some elements of uncertainty for the Japanese economy in FY2019, I expect that investments in IT will remain steady. It should be a special year for Japan with the hosting of the Rugby World Cup this year and the gathering of momentum in the preparations for the 2020 Summer Olympics in Tokyo.

Seeing the daily progress in the construction of the New National Stadium gives me a sense of awe. On the other hand, there is something that has been bothering me. It seems that the call for volunteers has already succeeded in gathering more than the number of volunteers in the call. However, with guests coming to Japan from around the globe, are the preparations to welcome them while overcoming language barriers going well as well?

Amazing technology for instantaneous speech-to-speech translation in multiple languages has appeared in recent years, but I feel that there is a surprising delay in the development of software and tools that will allow everyone to use the technology.

Progress in IT is bringing a continuous stream of software and tools that make our world more convenient. However, there are also technologies that have yet to see the light of day. I sense that there are more than a few things left untouched that would be relatively easy to resolve using such technologies. It would be wonderful to be able to play a hand in helping the buds of such technologies bloom, rather than doing not much other than waiting around, just counting the days until they flower.

Satoshi Kikuchi
President & CEO
ITOCHU Techno-Solutions Corporation

Special Feature

SUSTAINABLE DEVELOPMENT GOALS

What We Can Do Now for a Sustainable World

Conversation Between Yoshimoto Kogyo – Which Spreads Awareness of SDGs Through the Power of Laughter – and The President of CTC

As numerous environmental and societal challenges that need to be solved are being brought into relief, there is now growing interest in the Sustainable Development Goals (SDGs) that were set at the United Nations Sustainable Development Summit of September 2015. Yoshimoto Kogyo Co., Ltd., a comedy powerhouse, is involved in various efforts to use the power of laughter to spread awareness of the SDGs. What is it that can be done right now to sustain a vibrant world in which everyone can live in comfort? CTC' s Satoshi Kikuchi, president of the company that leverages the potential of IT to change the future for the Global Good, visited Yoshimoto Kogyo for a heart-to-heart on the SDGs and the future.

Coverage and text by Yuki Kondo

"SDGs Team"
Yoshimoto Kogyo Co., Ltd.

Special × Dialogue

Satoshi Kikuchi
President & CEO
ITOCHU Techno-Solutions Corporation

A Desire to Leverage Laughter to Contribute to Society

——While Yoshimoto Kogyo has almost been synonymous with comedy in Japan, it is now also exhibiting a strong presence as a leader in spreading the awareness of SDGs in the country. In fact, in 2017, you were a recipient of the Special Award in the 1st Japan SDG Awards. Meanwhile, CTC is very aware of IT's role toward achieving of the SDGs and is stepping up efforts to contribute to society through the company's core business. Can you first tell us how your respective companies built your awareness of the SDGs?

M. Haneda: Yoshimoto Kogyo will be marking its 107th anniversary in April this year. Over the years, the venues where our entertainers perform have continued to expand alongside the growth of television and the Internet. But, when we thought about the next 100 years for the company, we started to wonder if there weren't ways in which we could better utilize comedy and other entertainment for the good of society. It was during such times in 2016 that we were contacted by the United Nations Information Centre (UNIC) asking whether we would help them spread the SDGs throughout Japan. This led to our SDGs-related efforts, which we commenced in January 2017.

S. Kikuchi: CTC has just started its SDGs efforts, but they originated back in April 2015 when we reorganized our corporate mission and clearly stated that CTC would "change future for the Global Good."

It was while we were pursuing that mission that awareness toward SDGs, which were coming into the limelight, became stronger, and I started studying about it as well. In looking back at the history of the use of energy and resources, I had a sense of crisis to begin with that humanity and the Earth would be in big trouble if we did not take necessary action right away. So, I started feeling the excellence and importance of the targets outlined in the SDGs and affinity with the CTC mission, and that we needed to begin by spreading awareness of them at our Group. At the same time, I felt that it may not be easy to communicate the meaning of the SDGs simply through the SDGs logo that some creativity and effort would be required.

M. Haneda: When we started our efforts in 2017, we held an SDGs Kickoff Lecture and worked to make our 1,000 or so employees fully aware of the SDGs. We asked Kaoru Nemoto, Director of the UNIC Tokyo, to speak about SDGs. The lecture was held at our Lumine the Yoshimoto theater in Shinjuku, Tokyo. Employees working in and around Tokyo came directly to the theater, while those in the Kansai region watched the lecture live at our theater in Osaka. Live streaming on YouTube was also carried out for our employees in other parts of Japan. As a result, we were able to implement a study session that had an employee participation rate of nearly 100 percent.

Ms. Nemoto was involved in refugee-support activities for 15 years, and she said that she had felt through that experience the need under difficult circumstances for entertainment and laughter. She said that was why there was significance in having Yoshimoto communicate the SDGs to the whole nation in Japan. I believe that each of our employees empathized. That was how we launched our activities to communicate the SDGs – which may sound serious and difficult to understand – in an approachable manner through our entertainers.

S. Kikuchi: Indeed, the United Nations and Yoshimoto Kogyo is an unusual combination. Although awareness is growing regarding the term "SDGs" itself, when you think about how much the content of the SDGs is understood by businesses, I get the impression that its predominantly only in regard to the idea of a 12-trillion-dollar market opportunity being unlocked through SDGs. That concept seems to have taken on a life of its own. In that sense, I think that it's certainly a great, optimal idea to have Yoshimoto Kogyo spread awareness using the power of laughter.

Using Entertainment and Comedy to Boost Understanding of the SDGs

——Can you tell us what some of the specific efforts are?

M. Haneda: Ever since the kickoff lecture, we have done things like produce promotional content and participate in various events around Japan to promote understanding. We've produced around 30 promotional videos so far where we have popular entertainers engage in comedic dialogue about the SDGs. We show them at our theaters, loan them out for showing elsewhere or for streaming on websites. We have succeeded in having them viewed by a large number of people. As part of accessible events, we also devised the idea of the SDGs stamp rally. (Note: A stamp rally is a popular Japanese activity in which people visit various places to collect ink imprints made by rubber stamps.)

T. Oinuma: The individual stamps for the rally were developed by expressing each of the 17 Global Goals using the words and comedy routines of our popular comedians. The idea behind this that the goals would be easier for people to understand that way. We had about 5,000 people, including children, take part in the stamp rally held at the Okinawa International Movie Festival, which is a huge event for the whole island. We've so far had a total of about

Yoshimoto Kogyo Co., Ltd.' s Tokyo headquarters is housed in a converted primary school, with many of the original facilities utilized as is.
CTC President Kikuchi with members of the "SDGs Team": Takayuki Oinuma, Kazutaka Shimura, Tsuyoshi Nakajima, Miyabi Haneda, Satoshi Kikuchi, Yasuo Nagai, Katsuaki Yamaji (L-R)

Yoshimoto Kogyo Co., Ltd.' s "SDGs Team"

The team is centered around members of Corporate Communications. It plans and executes various events and activities to spread awareness of SDGs within and outside the company. The following members participated in this special dialogue.

Miyabi Haneda, Corporate Officer & GM, Corporate Communications
Tsuyoshi Nakajima, Deputy GM, Corporate Communications
Kazutaka Shimura, Director, Digital Business
Takayuki Oinuma, Producer, Corporate Communications
Yasuo Nagai, Producer, Corporate Communications
Katsuaki Yamaji, Producer, Corporate Communications

Satoshi Kikuchi

President & CEO, ITOCHU Techno-Solutions Corporation. After joining ITOCHU Corporation in 1976, worked in the Energy Administrative Division and in London and Oman before holding various positions, such as GM of Metals and Energy Development, GM of Corporate Planning and Administration, Managing Director, and President of Chemicals, Forest Products & General Merchandise Company. In current position since 2012.

What are SDGs?

SDGs is an abbreviation of Sustainable Development Goals. It refers to the international goals for between 2016 and 2030 that were outlined in the 2030 Agenda for Sustainable Development, adopted at the UN Sustainable Development Summit of September 2015. SDGs comprise 17 Global Goals and 169 specific targets for achieving a sustainable world. They pledge that no one on Earth will be left behind, and various efforts are being carried out around the world at various levels, from state to private initiatives, toward achievement of the goals and targets.

Satoshi Kikuchi
President & CEO
ITOCHU Techno-Solutions Corporation

Miyabi Haneda
Corporate Officer
GM
Corporate Communications

50,000 people participate in the stamp rallies held at various events. We think that it is creating a great opportunity for people to come into contact with SDGs.

T. Nakajima: We also have the "SDGs-1 Grand Prix" in which each entertainer or comedy group chooses three goals from among the 17 SDGs and compete in improvised comedy routines that incorporate the three chosen goals. For example, they would think on the spot of a routine that includes GOAL 5: Gender Equality, and perform the improvisation. The audience may applaud them for being able to incorporate it in a funny way, or they may roll their eyes and say that the inclusion was too abrupt and forced. Everyone gets swept into it. When we did it in Hokkaido, there was standing-room-only in a theater with a capacity of about 300 people. The audience may have come to participate in the event, but they end up learning about the SDGs as well. We consider it a success if people come into contact with the SDGs, and they leave an impression on them, or it makes them want to learn more about the SDGs.

S. Kikuchi: When we look at our work on the basis of the SDGs, we see that the SDGs are indeed a training ground that enables both corporate and individual growth. In working to spread the SDGs in the CTC Group, we have felt the importance of communicating the goals in an easy-to-understand manner. I empathize with the idea that videos, stickers and other creative items that incorporate comedy help spread individual awareness toward the SDGs. In April, CTC holds an annual kickoff event that about 4,000 CTC Group employees participate in. It would be great if we could collaborate in some way with the SDGs-1 Grand Prix.

A Desire to Leverage the Strengths of the Company to Contribute to Global Goal Achievement

M. Haneda: Our efforts go beyond just making people aware of the 17 Global

Each of the 17 SDGs have been rephrased using the words and mannerisms of Yoshimoto Kogyo entertainers and made into rubber stamp designs. For example, in the rubber stamp for GOAL 16: "Peace, Justice and Strong Institutions," comedian and actor Kendo Kobayashi says, "You must be out of your mind if you don't wish for peace!"

Goals for Sustainable Development. For example, we are starting an effort to create educational content that utilizes comedy and entertainment.

K. Shimura: We have a plan for GOAL 4: Quality Education, where we want to develop educational content utilizing our strengths. It would be different from the entrance-exam-centric education that we have in Japan today. There would be focus on having students think of ways to solve global problems or helping them find areas in which they can feel confidence. We hope to communicate to children world views that take perspectives like those of the SDGs.

S. Kikuchi: I have heard that today, even elementary school-age children are familiar with the phrase "sustainable society." It is important that people develop that kind of awareness from childhood.

M. Haneda: We want to continue giving a hand to spread the awareness of the SDGs nationwide using the power of laughter, but at CTC, you must be taking a completely different approach since your strengths are in information technology.

S. Kikuchi: Yes, that's true. We at CTC are engaged in several initiatives that are directly linked to the SDGs. One of them is renewable energy.

When people think about renewable energy, they tend to think that it's important to increase the use of renewable energy. But that's not necessarily the case. For example, natural sunlight and wind power are not always available and are therefore unstable sources of energy. The more you increase the proportion that such energy sources account for in the electrical power that is used, the greater the risk becomes of an unstable power supply. To promote the adoption of renewable energy while mitigating risks, we need to forecast the output of wind and solar power generation, and adjust thermal and hydro power generation accordingly. CTC is involved in forecasting the output of renewable energy. Last year, we also tied a capital and business alliance with CoCooking Co., Ltd., which operates TABETE. It's a platform for sharing cancelled or unsold foods from restaurants and delicatessens. This is an initiative that aims to contribute to reducing food waste, said to amount to 6.46 million tons a year in Japan. We also jointly developed a smartphone app for this.

Y. Nagai: How interesting! That's linked to the SDGs' GOAL 12: Responsible Consumption and Production.

Awareness of the SDGs Changes People's Mindsets

——The SDGs advocate the achievement by 2030 of a diverse, inclusive and sustainable society that leaves no one behind. As you implement various efforts, are there times when you feel changes taking place around you?

S. Kikuchi: Human beings have been around for only 200-thousand of the 4.6-billion-year history of the Earth. In the past two or three hundred years in particular, sources of energy, which were originally only human or animal, developed from steam locomotion, coal and oil to nuclear power, with energy consumption increasing explosively. The global population is projected to reach 10 billion in the not-too-distant future. Can the Earth sustain such numbers? Combined with various problems, humanity is very close to reaching a danger point.

It is with this and other reasons in the background that the SDGs are being advocated. The world must share these goals and take earnest action. I have some doubts about the translation of the word "development"

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in the Japanese term for sustainable development goals. One of the uses of the word that was chosen in Japanese is to refer to the development of technologies and products, and I wonder if it does not make the SDGs sound specialized. I personally feel that the word used for growth may have been better if there was emphasis placed on spreading the term. It was when I was thinking that we had to be creative and use ingenuity in communicating the concept that I learned about the efforts being taken by Yoshimoto Kogyo. I thought, how amazing!

M. Haneda: I think there is an increase in the number of people who feel that we must do something right now. Just as you are leveraging IT, I believe that there is a stronger tendency now of others also using the area of their own strengths to help achieve the SDGs.

At Yoshimoto Kogyo, we want to communicate the SDGs and build awareness by leveraging our strengths in entertainment and comedy. It requires persistent effort and is not necessarily easy. However, we are moving forward with the belief that awareness will gradually spread if we communicate the SDGs carefully at events and in other ways.

S. Kikuchi: Achieving the SDGs by 2030 and leaving no one behind is a difficult goal to reach. However, isn't it significant that by continuing your efforts with the SDGs in mind, even the people who are involved in carrying out the efforts will naturally start to think in such ways?

M. Haneda: Before this, we emphasized entertaining television and theater audiences as well as those participating in events, and having them go home after enjoying a good laugh. However, since we started becoming conscious of the SDGs, I think our employees have started to think of how they can get audiences to become a bit more aware of problems on Earth in addition to having a good laugh. I think that is an important change that has occurred.

Since FY2018, Yoshimoto Kogyo has been holding the JIMOT CM REPUBLIC competition in which participants create a 30-second or shorter video of something around them that they want to leave behind for the future, which is then submitted on social media. The idea is that passing something around you onto the future should lead to aiming to achieve the SDGs.

S. Kikuchi: Yes. I think that by getting to know about the SDGs, there are many people who are starting to think about what their daily work is ultimately linked to, and how it is connected to society and the Earth. As mentioned, CTC's mission is to change the future for the Global Good. By linking our actual operations to the 17 SDGs, it becomes clear how we are specifically contributing to society. I think that is very significant. It is also an opportunity for us to reflect on and reaffirm our businesses.

What We Can Do in the Next 10 Years

——There is only around 10 years until 2030. What is your outlook regarding your SDGs initiatives?

T. Oinuma: Up to now, we have focused on making people aware of the SDGs. I think we are now at a stage when we want people to start taking action. We want to come up with events that will inspire people to try doing the same kinds of things.

Y. Nagai: Since 2011, Yoshimoto Kogyo has been implementing the "I Will Live in Your Town Project" in which our entertainers relocate to one of the 47 prefectures in Japan and tackle problems faced by that community. We have them actually live in various areas, come face to face with the challenges of the region, and participate in and help boost their events. The assistance that they are actually offering may be small, but by taking action, they come into contact with the opinions of the people there. We want to try something new using such information. If you start out by saying, "Let's do something for SDGs," it can be difficult. However, if you listen to local opinions, take action by cooperating, even if in a small way, and keep on doing that, I think we can find ourselves closer to achieving the SDGs as a result.

S. Kikuchi: At CTC, from the 17 SDGs, we are clearly narrowing down those Global Goals that we may be able to achieve using our strengths in IT, and working to spread it.

Furthermore, I am also personally sensing the negative aspects of IT. Whether it's in the form of cyberattacks or artificial intelligence, when you think about the future of IT, there is a strong possibility that IT becomes a threat in itself. That's why I believe that it's the mission of CTC to contribute to society through IT. If you make the SDGs one of the indicators, employees can believe that what they are doing is heading in the right direction. They should also become guideposts for moving forward, step by step.

M. Haneda: I think that it is also thanks to the SDGs that we have been given this opportunity to have such a meaningful conversation.

S. Kikuchi: The SDGs teach us what we should be doing. I hope we can take to heart its principles and steadily carry out what can be done at the present time.

An SDGs Walk was carried out during the Minwara Week in Sapporo City, Hokkaido. Participants enjoyed walking with Yoshimoto Kogyo entertainers. At checkpoints along the way, they chose pin badges that have one of the 17 SDGs on them, pinning them onto a tote bag that were distributed to them in advance. They collect the badges as they walk towards the goal. More than 500 people participated in the SDGs Walk at last year's Minwara Week.

Efforts to Spread the Use of Renewable Energy

Renewable energy can be used as a countermeasure for global warming. It leads to the improvement of energy self-sufficiency ratios and also plays a major role in the achievement of Sustainable Development Goals (SDGs). There are great expectations being placed on the spread of renewable energy use. In this report, we will take a look at the benefits and issues related to renewable energy as well as provide a description of CTC's E-PLSM IoT platform, which contributes to the spread of renewable energy use.

Kensuke Saji

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Renewable Energy and SDGs

Energy accounts for about 60 percent of the world's total greenhouse gas emissions,*1 and expansion of the ratio of renewable energy in the energy mix is recommended as a measure to combat global warming since no greenhouse gas (CO_2) is emitted during power generation (SDGs GOAL 13: "Take urgent action to combat climate change and its impacts"). Renewable energy resources include sunlight, wind, geothermal heat, small- and medium-hydropower and biomass.

Unlike exhaustible energy resources like oil and coal, for which producing countries are limited, renewable energy utilizes natural energy resources that are available in many places around the world. Therefore, depending on technology, renewable energy can achieve local production for local consumption. There are expectations being placed on its spread in developing and least developed countries as well.

Challenges Related to the Spread of Renewable Energy Use

Although renewable energy is expected to contribute to the environment as well as improve energy self-sufficiency in such ways, there are many challenges for it to spread.

According to 2017 statistics, renewable energy accounts for roughly 27 percent*2 of all power generated in the world. In Canada, that ratio is over 60 percent, and it is more than 30 percent in Germany and Spain. In Japan, renewable energy accounts for about 16 percent*3 of all power generated in the country, and the government has hopes to increase renewable energy share by setting a share target of between 22 and 24 percent for 2030. Sustainable Energy for All (SEforALL) is an international organization that is closely related to the SDGs GOAL 7. SEforALL's target is to double the share of renewables in the energy mix from the 2010 figure to about 36 percent in 2030. There is an urgent need to develop related technology as well as prepare rules to achieve these figures.

One of the challenges in Japan for the spread of renewable energy use is cost reduction. For example, solar power generation in Japan is said to cost nearly twice as much as in Europe. Research and development toward cost reduction and the feed-in tariff (FIT) system (fixed price incentive) play a major role in this.

Another challenge is the securement of stable power supplies. Achieving a continual balance between demand and supply is necessary in the case of electricity. Wind power and solar power generation account for a major proportion of renewable energy, but the output varies greatly depending on the weather. Therefore, adjustments must be made in the case of large-scale integration of renewable energy to ensure a stable supply of electricity.

For the Stable Supply of Electricity

There are several approaches being considered toward the stable supply of power in the large-scale integration of renewable energy.

In terms of demand, "demand response," which primarily reduces demand during supply-demand crunches, and "virtual power plants (VPP)," in which integrated control and utilization of numerous diverse and decentralized energy sources is carried out, are some of the approaches that are attracting attention.

Meanwhile, one of the approaches related to the supply side is the utilization of storage batteries. For example, output smoothing can be attempted for ever-changing power supplies by storing electricity generated on days with strong winds or clear skies in a battery and using the electricity when there is a shortage. In the past, it was said that the capacity of storage batteries was too small relative to electrical demand. However, after repeated demonstration trials, the batteries are getting closer each year to becoming capable of meeting demand (e.g., demonstration trials in Australia by Tesla). Research on power storage utilizing hydrogen is also progressing, and there are also expectations in its application as a means to transport electricity.

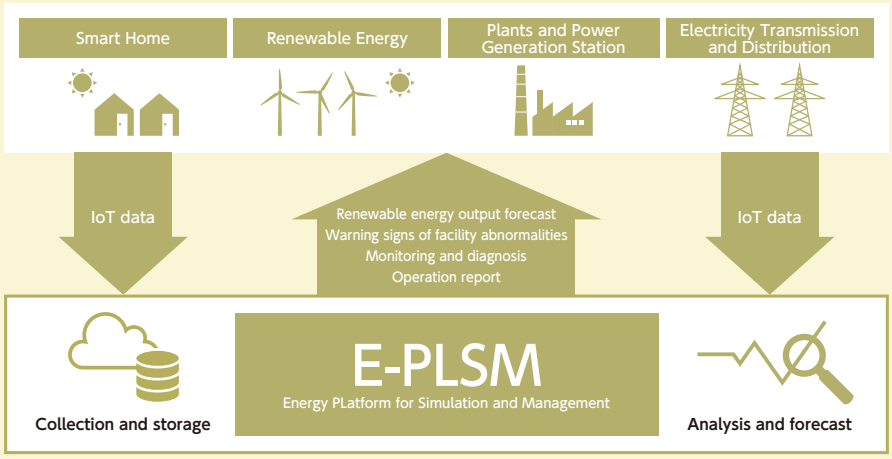
Meanwhile, CTC has been engaged for

■Contribution to SDGs GOAL 7

Ensure access to affordable, reliable, sustainable and modern energy for all

At the current time, approximately 3 billion people around the world rely on wood, coal, charcoal and other fuels, which can have an adverse effect on health, for cooking and heating. Additionally, slightly less than 1 billion people have no access to electricity.*1 SDGs GOAL 7 seeks to resolve these issues, and renewable energy plays a central role in its achievement.

■Cloud-type IoT Platform – E-PLSM



many years in the forecast of renewable energy output. Forecasting the ever-changing amounts of generated power and systematically controlling it enables stabilization of the power supply. When there is a shortage of generated power, it can be compensated using thermal or hydro power generation. If there is an excess, it can be suppressed.

CTC' s Efforts

Around 30 years ago, CTC embarked on meteorological analysis using computers, and began wind condition analysis for the forecast of the amount of electricity generated through wind-power generation. CTC also became a licensed provider of forecasting services (Japan Meteorological Agency Forecasting Authorization No. 94). Centered around wind power generation output forecast services, the company has been providing total support for wind power generation businesses, from siting surveys for the installation of wind turbines to their design and operation. Furthermore, using the weather and wind power generation expertise accumulated by the company as the foundation, CTC has also been providing services related to solar power generation since the late 1990s, when it was starting to spread as a power source. Services include solar power generation output forecasts and commercial feasibility evaluations.

The E-PLSM IoT Platform

Since 2011, CTC has been offering E-PLSM, which is a cloud-type IoT platform for integrated control of energy use. It is used to monitor facilities, such as power generation equipment and plants as well as equipment for energy transmission and distribution. E-PLSM carries out data collection and analysis, data processing for forecasts, etc., as well as graphical display. It uses U.S.-based OSIsoft' s PI System IoT software as the data collection and analysis platform.

E-PLSM has a function for forecasting power output by utilizing information from sensors at a power plant in addition to meteorological information, such as wind direction and velocity, solar radiation intensity and temperature. Based on the knowledge gained through demonstration trials and involvement in businesses in the renewable energy sector, CTC continually renews the forecast model and improves its precision, including segmentation of the time-space mesh and reduction of prediction errors.

There are two menus for forecasts—short-term and short-time. The short-term forecast is in half-hour intervals for up to three days ahead and is updated every six hours. It is useful, for use in electricity trading for sales planning and thermal power generation operation planning, for example. The short-time forecast is in half-hour intervals for up to six hours ahead and is updated every hour. It can be used to streamline monitoring and operation of power generation plants or for the electricity transmission and distribution business to adjust power supply and demand for a few hours ahead.

Furthermore, it also has the function for detecting the warning signs of abnormalities in generation facilities and can be used to reduce unplanned stoppages. Predict-it, which is the software of U.S.-based engineering company Engineering Consultants Group (ECG) that detects warning signs of abnormalities, is also employed. Since becoming ECG' s first Japan-based agent in 2016, CTC has been working on predictive maintenance, chiefly in the electric power and energy sectors. It has been offering the service to numerous customers in Japan.

CTC will continue to expand E-PLSM, including its analysis and facility management functions, and contribute to the achievement of SDGs through advancements in renewable energy technology.

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Proof of Concept Utilizing Blockchain for Traceability

An ITOCHU Corporation proof-of concept is being carried out for traceability utilizing blockchain technology in the supply chain for natural rubber raw materials. It is attracting attention as an undertaking that could also contribute to the achievement of Sustainable Development Goals (SDGs).

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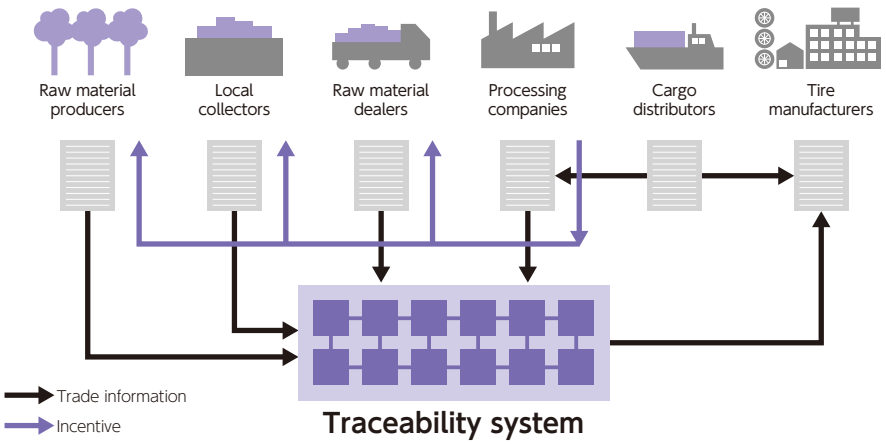
Securing Transparency Using Blockchain Technology

ITOCHU Corporation has commenced a proof of concept (PoC) for the construction of a traceability system that utilizes blockchain technology for the stable procurement and supply of raw materials, and the transparency of distribution of resources in the supply chain of ITOCHU's investment companies and of handled products.

The PoC utilizes the natural rubber raw material supply chain of PT. Aneka Bumi Pratama, a natural rubber processing company headquartered in Indonesia that is fully owned by ITOCHU Corporation. CTC is building the traceability system for the PoC.

Natural rubber is a resource that is essential to our daily life. It is mainly produced in Southeast Asia in countries such as Thailand and Indonesia. Roughly 70 percent is used for tires. As motorization progresses around the world, the demand for natural rubber is expected to continue growing. However, there are reports of issues, such as deforestation and the violation of the rights of local residents. It is critical that ITOCHU promotes business activities that give consideration to the environment and human rights. Currently, multiple operators (e.g., local collectors and raw material dealers) are involved in the supply chain, from raw materials producers to delivery to tire manufacturers. Higher transparency is sought in natural rubber distribution.

■Natural Rubber Supply Chain and Proof of Concept



An Undertaking that Also Contributes to the Achievement of SDGs

In the PoC, a smartphone app is used between the buyers and sellers to carry out mutual authentication of the content of the transaction, which is recorded in the blockchain together with other information, such as date, time and location. This is to achieve transparency of distribution up to arrival at the processing plant. Furthermore, to promote the cooperation of the various operators involved, a system for offering an incentive for the accurate recording of information will also be prepared.

In terms of SDGs, by contributing to the protection of workers' rights and the realization of a safe, comfortable working environment, the traceability system will help achieve GOAL 8: Decent work and economic growth. From the aspect of managing nature, including forests, it is related to GOAL 15: Life on land.

Blockchain is highly resilient against data manipulation, and it is suitable for use in systems that manage transactions, such as the authentication and authorization of individuals, and money transfers. Because of this, there are expectations for its use in financial inclusion (financial services that are available to everyone), and public services that utilize IDs. CTC will continue to pursue blockchain technology and work toward its popularization.

Traceability

Virtual Reality Technology Enables Visualization of Inaccessible Spaces

Eleven years ago, CTC began providing a practical solution that enables, through the use of virtual reality technology and data analysis, the visualization of places that cannot be seen with the human eye or reached by people.

Science & Engineering Systems Division
ITOCHU Techno-Solutions Corporation

Improvement of the Safety and Efficiency of Nuclear Reactor Decommissioning Work

The Naraha Center for Remote Technology Development, Sector of Fukushima Research and Development, Japan Atomic Energy Agency, is a facility that can be used for the development and demonstration trials of remotely controlled devices (robots, etc.) for use in the decommissioning of Tokyo Electric Power Company Holdings, Inc.' s Fukushima Daiichi Nuclear Power Station. The research administration wing contains a virtual reality (VR) system, robot simulator and audio-visual facilities that can be used for reviewing decommissioning work plans and worker training.

With the objective of enabling safe and efficient execution of decommissioning work, the VR system recreates nuclear power generation facilities in 3D at full scale. It gives the sense of being at the actual site so that decommissioning worker training as well as consideration and verification of work plans can be carried out. It enables confirmation of safe routes to sites where work is to be carried out, the assumed amount of radiation exposure, and training in the operation of remotely controlled devices.

Wide-ranging Contributions for Solving Social Challenges

CTC handled the design and development of this VR system using the simulation technology that it had accumulated over many years. As the VR solution, a Christie Digital System (Japan office transferred to Ushio Lighting, Inc. in April 2018) four-screen stage, which provides a deep sense of immersion, is used. VR is being recreated using point-group and 3D-CAD data.

In terms of VR technology, CTC has been offering a VR solution in underground resource exploration analysis from 11 years ago. Artificial vibration is generated downward. The manner in which it is reflected by the underground interface is measured, and the data is processed to investigate how resources, such as oil, are flowing as well as the underground structure. To make it easier to understand what things are like underground, CTC has been providing 3D visualization VR technology to research institutions.

In recent years, technology for underground resource exploration is also being utilized in the field of geothermal power generation. There are expectations that geothermal power generation will become the second base-load power source after fossil fuels. Going forward, the depth of geological surveys, which are currently being carried out at about 1,000 meters, will probably proceed even deeper to depths of 2,000 or 3,000 meters.

CTC will continue to leverage its strengths in simulation technology that utilizes data, and VR technology that visualizes spaces that people cannot get to, and contribute to the resolution of challenges faced by society.

■The VR system at the Naraha Center for Remote Control Technology Development

Tallinn, capital city of the Republic of Estonia. Estonia is attracting attention as an advanced IT country.

This issue's theme is...

【Digital Government】

As society at large undergoes a rapid digital transformation, governments are also being pressed to increase efficiencies through digitalization. The "Digital Governments" that countries are building are not simply platforms for increasing work and service efficiencies. With the coming of digital governments, an entirely new concept of the state is becoming visible. This article will look at an advanced case of another country.

Text by Yuki Kondo

Streamlining Seven Government Office Visits into One

Did you know that residents in Japan usually need to visit local government offices a number of times when they move to another location in the country?

First they need to visit the city hall or ward office corresponding to their former address to obtain a moving-out certificate. Then they need to submit this certificate to the city hall or ward office that corresponds to their new address. If they are enrolled in National Health Insurance, they need to present a moving-out certificate for procedural purposes. If their children are enrolled in elementary school, in addition to performing procedures for transferring out of the old school and into the new school, procedures to obtain child benefits need to be done after obtaining taxation certificates at the tax office. To change addresses on their driver's license, residents need to visit a police station near their new address and bring a certificate of residence with them, and so on.

According to the "Toward Realizing the World's Most Advanced Digital Government" paper released by the Prime Minister's Office of Japan, at the minimum residents changing addresses need to visit various offices and city hall or ward offices two times for their previous address and five times for their new address. Many have experienced the work and waiting times required to fill in their addresses and names at each step in the process.

Not only do residents incur lost time and experience inconvenience, the onerous process is also reflected in administrative costs. Furthermore, while the private sector has already progressed in the digitalization of their work processes, they encounter bottlenecks since governments keep their various processes in place.

"Digital Government" is a term used for digitalized government services that aim to solve these administrative issues. In light of the rapid development of digital technologies in recent years, governments in various countries around the world are now being pressed to undergo digital transformations.

The Digital Government Framework

Digital government initiatives at various countries started in the 1990s and 2000s. Through their own processes of trial and error, Australia, the United States, the United Kingdom and Estonia created digital platforms. After that, with the dramatic development and adoption of digital technologies in the 2010s, all advanced countries kept pace. Japan, which was behind initially, also set forth a "Digital Government Action Plan*1" in January 2018.

What are the specific aims of the plan? Looking at Japan's Digital Government Action Plan, it covers three main points within a large framework:

1. Complete digitalization of administrative services
2. Total transparency of data held by administrations
3. The building of a foundation for digital transformation

These frameworks are basically common to every country, and the specific methods, in other words the ways of building system architectures and the degree of coordination with the private sector and other factors, differ by country. In Japan's case, point 1 involves putting various procedures online (digital first), streamlining processes so the same information does not need to acquired multiples times (once only), and consolidating to one point of contact when performing procedures such as changing addresses (one stop). Point 2 concerns the design and operation of work and systems based on the assumption of open data. Point 3 involves the construction of digital platforms to consolidate basic administrative data on individuals and enterprises. Japan's construction of a digital platform that commenced for its Individual Number System is the main focus of point 3.

Estonia Seeks "e-Residents"

As countries pursue their own digital government initiatives, one country in particular is attracting attention: Estonia, a small country in Northern Europe located on the western border of Russia. Estonia has a population of about 1.3 million and a land mass equivalent to that of Japan's Kyushu island. Since 99% of its administrative services can be completed online 24 hours a day, Estonia is known as the world's most advanced IT country.

According to the "e-Estonia" website*2 operated by the government, Estonia began putting its administrative services online in 1997, and then began building a digital government with digitalized tax filing (2000), ID cards for all citizens (2002), digitalized voting (2005), and digitalized health data (2008) thereafter. As a result, the government has calculated that currently 800 years of work time have been reduced annually.

However, these digital services are not why attention is focused on Estonia. What stands out as being unique is Estonia's e-Residency (digital residency rights) initiative that started in 2014. Under this system, even foreigners without residency rights can use Estonia's administrative services when they are certified as e-Residents. When foreigners acquire this certification, they can start a company in Estonia online. By providing a system that offers an advantageous means for entrepreneurs around the world to deploy businesses in the EU region, the Estonian government is seeking to increase the number of e-Residents.

While Estonia originally started the program under the slogan of "Increase the Population to 10 Million by 2025," currently the main objective of the program is to create an environment so anyone in the world can start a business there. The system is still under construction, so while many issues remain, as of April 2018, 35,453 e-Residents were registered and 3,507 companies were established. Today, the pace of registrations is said to be accelerating.

Changing Concepts for What Constitutes a Nation and Citizens

When looking into why Estonia leaped ahead of other countries on the path toward digitalization, the answer has to do with its previous status as a republic under the control of the former Soviet Union. At the time, republics in the Soviet Union and Eastern Bloc countries were responsible for different industries under a mutual assistance framework (the Council for Mutual Economic Assistance, or COMECON). Within that framework, Estonia was responsible for IT-related industries. In other words, Estonia was ahead of other countries in fostering human resources skilled in IT. In addition, with more than 2,200 islands as part of its territory, the utilization of digital technologies was necessary to provide administrative services to all residents.

Other countries are starting their own similar e-Residency programs. One cannot dismiss Estonia's program as a special case of another country. In other words, if it becomes possible to establish companies and reside in other countries digitally without being present physically, and if these countries provide services superior to home countries, we are in an era where citizens may digitally immigrate to other countries.

The essence of digital government is not just concerned with making a country's services more convenient and efficient. Digital government alters the concept of a nation and citizenship. Digital government has made it clear it has the potential to make borders fuzzy.

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CTC Programming Workshops Help Foster the Next Generation of IT Workers

As a member of regional communities, the CTC Group is proactively involved in social contribution activities in a broad range of fields, including environmental conservation, social welfare, activities to train the next generation, international assistance, and contributions to local communities and cultural activities. At the same time, the CTC Group is aiming to realize an affluent society by putting its human resources, knowledge and information technologies to good use.
In this issue, we look at the "Children's Technology Challenge IT workshop class" run by the CTC Group for children who will bear the future, and one of its classes, "Let's try! IT engineer."

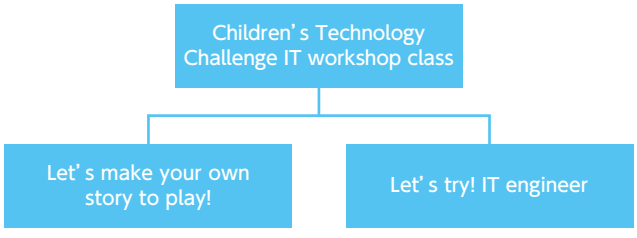
Yumiko Sakai

Corporate Communications Dept.
ITOCHU Techno-Solutions Corporation

The "Children's Technology Challenge IT Workshop Class" Fosters Children's Potential

The "Children's Technology Challenge IT workshop class" is a programming class that began in 2015 as a CSR activity. By teaching programming skills, the class fosters the logical thinking, creative, and expressive abilities of children who will bear the next generation. Since the program began, a workshop for creating "Let's make your own story to play!" using tablets has been held 31 times with approximately 700 children participating. Furthermore, in the lead up to 2020 when programming classes will be compulsory in Japan's elementary schools, in 2018 the CTC Group developed "Let's try! IT engineer," a new visiting lecture that helps children think like programmers. Six visiting lectures have been provided for a total of approximately 400 children.

未来実現IT教室
Children's Technology Challenge



For more on "Children's Technology Challenge IT workshop class," access this QR code (in Japanese)

Children are fascinated by Ozobot as it runs automatically along lines traced on a map.

"Let's try! IT engineer" Lets Children Have Fun While Studying IT

In "Let's try! IT engineer," children become "IT engineers." While studying things around them that use IT, as a group work assignment that uses a CTC solution for materials, students think up their own solutions for a town delivery system. Using a small sensor robot (Ozobot*) with a map they have created themselves, students hypothesize what the most efficient delivery routes are on a map with many roads, and use the sensor robot to test their hypothesis.

The workshop allows student participants to experience the thinking skills required for programming without using a programming language, and the class is not dependent on a school's ICT environment. We developed the program in response to comments from class teachers in schools who were not sure where to start with programming education.

Through the "Children's Technology Challenge IT workshop class," the CTC Group will continue to help foster people who will bear the next generation.

*Ozobot: Developed by US company Evollve, Ozobot is the world's smallest programming robot. Ozobot has a "line trace" function that allows it to follow and move along black lines. Ozobot can be programmed to move on its own by reading different color combinations that give orders (such as move forward, turn left, turn right).

News Pickup

Here is information on solutions and services,
selected from CTC news releases, that are in the limelight.

Agile Development

CTC Opens Agile Development Workspaces That Enable Lean Startups

CTC opened "Agile Offices" in Tokyo and Toyota City. These new workspaces dedicated to agile developmenta and simplify communication between customers and engineers, and make it possible to bring together related parties for meetings. As IT utilization advances with the onset of digital transformation, companies must speed up their decision making and increase work efficiencies. With the opening of these workspaces, small-scale new businesses can set up rapidly. Since changes can be made repeatedly in a flexible manner, these workspaces strengthen the agile development structure.

Investment in Innovation

CTC Invests in Food Loss Reduction and Resale Businesses Through CVC

Through CVC, CTC invested in CoCooking, a company that provides the "TABETE" platform to reduce food loss, as a business investment to support a startup and form a joint venture with a customer. Cocooking and CTC jointly developed the TABETE app for smartphones.
CTC also invested in Active SONAR, a company engaged in the luxury brand resale business. CTC formed a business partnership with Active SONAR for a platform business centered on "RECLO," Japan's largest luxury brand resale platform.

Life Sciences / AI

CTC Begins Offering Sinequa Products Enables Comprehensive Batch Searches

CTC commenced sales of Sinequa ES, a cognitive search engine that works in conjunction with companies' internal and external systems and clouds to enable batch searching of various data sources, including both structured and unstructured text, voice and image data. Sinequa ES is equipped with natural language processing and machine learning capabilities, enabling it to produce elaborate search results by extracting key themes from documents and categorizing results based on those themes. CTC will provide services for the implementation of Sinequa ES, including consulting, training, technical support and linking with legacy systems.

AI / Training

Fostering AI Personnel Companywide Strengthening AI Business Promotion Structure

CTC is fostering personnel with AI literacy companywide to further strengthen its AI business promotion structure. CTC conducted education programs on basic AI knowledge and applied technologies for approximately 3,000 sales representatives and engineers. Furthermore, CTC plans to offer training for AI-based data analytics and development, technologies for implementation, AI development frameworks, analytical tools and other product-related topics.
By strengthening training for engineers with high-level AI skills, CTC is building a team structure capable of actively deploying AI technologies for business.

Cloud / Security / Operation and Maintenance

Providing a Centralized Managed Service that Supports the Construction and Operation of Multi-cloud Environment Infrastructure

CTC commenced sales of "'CUVIC' Managed Multi-Cloud Platform," an integrated platform that supports the centralized construction and operation of multi-cloud environment infrastructure. The platform is a comprehensive managed service that comprises multi-cloud environment construction that includes on-premise construction, system-wide monitoring, back-ups, security measures and other services. Harnessing its know-how based on years of providing system construction and managed services, CTC will support customers' digital businesses.

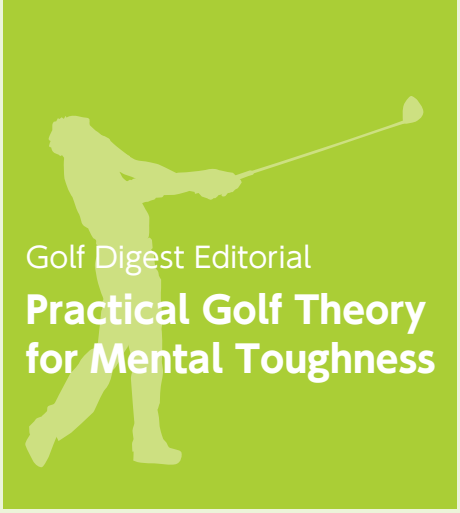
IoT / AI / Agriculture and Social Welfare Collaboration

CTC and HINARI Commence Future-type Universal Agriculture Trials that Use ICT

CTC and HINARI, a special subsidiary of CTC engaged in universal agriculture, commenced "Future-type Universal Agriculture" trials that utilize ICT. Using AI and IoT, the companies will monitor the status of agricultural fields, visualize agriculture data, analyze the optimal conditions for growing vegetables, and conduct other activities. Recently, collaborative projects between agriculture and social welfare organizations known as "Nofukurenkei (Agriculture-Welfare Collaboration)" (universal agriculture) are attracting attention in Japan as they encourage the social participation of people with disabilities and the elderly. Utilizing IT, CTC and HINARI will support increased efficiency in agriculture and the employment of those with disabilities.

Please visit the following for further details.

http://www.ctc-g.co.jp/news/



Golf Digest Editorial

Practical Golf Theory for Mental Toughness

(With the cooperation of Team Serizawa Golf Academy)

Pressure Should be Enjoyed, Not Overcome

There is no other sport that tests athletes' mental toughness as does golf.
A huge part of golf – which requires manipulating a stationary ball using one's physical strength in combination with technique – is its mental aspect.
Emotions like, "I don't want to mess up," or "I want to make a good shot," can affect the play adversely.
Let's take a look at how you should deal with such pressure.

It Is When Shots Seem Doable that the Desire "Not to Mess Up" Creates Pressure

Even when simply playing golf with friends, if it is for par, amateur golfers can frequently freeze up and fail to make a straightforward, 1-meter putt. Even more so if the golfer is participating in a country club's monthly competition or an amateur golf tournament. Such players have probably experienced the crush of pressure on more than one occasion. What exactly is this pressure that we are talking about here?

Let's say, for example, that there is a pond in front of a golfer, and getting over it requires a carry distance of more than 200 yards. If that golfer were someone who cannot achieve a 200-yard carry distance to begin with, would that person feel pressure when faced with that pond and the 200-yard shot it requires? The answer is "No." This is because if it is something that people do not feel is within their skill level, then they would normally swiftly switch gears, without any question or pressure, and think of another way for moving forward. On the other hand, let's say that it is a golfer who might just about be able to make it over the pond if a 3- or 5-wood were used. If that were the case, that golfer would probably feel a huge amount of pressure greater than any for his/her usual 3- or 5-wood shots.

In other words, pressure is felt when the challenge being faced would be doable if a person can exhibit his/her usual capabilities. This is not limited to golf. It is a truth that is common to anything that happens in a person's life. It is when something seems "doable" that the desire to "do well" and "not mess up" arises. The stronger a person's desire to succeed in a challenge, the greater the pressure that is felt.

Assess the Pressure Calmly and Focus on What Is Doable

If you feel pressure, you should not try to overcome it. Instead, you should acknowledge that you are feeling pressure, think of what you can do under the circumstances, and do your best. This is the right way to deal with the situation. Even if a shot in front of you is one that you would normally be able to make without any problem, the success rate of a shot naturally falls when you are under pressure. That

Nobuo Serizawa

Born 1959; age 59. A lifetime record of five Japan Golf Tour wins, including the Japan PGA Match-Play Championship (1996). One Japan PGA Senior Tour win marked since becoming eligible. Currently heads Team Serizawa, which he formed with professional golfers Hiroyuki Fujita and Katsumasa Miyamoto. Opened a golf academy at the Daihakone Country Club. Has many fans and followers and is known for his easy-to-understand golf lessons.

being the case, do not tell yourself, "It' s a shot that I can normally make without any problem, so, I absolutely want to get this shot on the green." Instead, acknowledge the pressure and think, "I am feeling pressure, so I might not be able to make my normal shot." Then, look for a safer way to get to the green.

Mental toughness does not refer to being able to withstand any kind of pressure, no matter how strong. It is the strength to acknowledge what you can or cannot do, choose what can be done and see it through.

In that sense, being able to stick to your own style of playing golf no matter how others are playing is also a type of mental toughness. When I first became a pro golfer, it was the golden age of the AON trio (Isao Aoki, Masashi Ozaki and Tsuneyuki Nakajima), but I never thought of competing against them using their kind of playing style. My carry distance is on the lower end of the scale among professional golfers. That was why I emphasized accuracy over distance. I believe that my strengths in competition are in the second shot onward and not in the first driver shot, and I played my golf that way. I was able to win tours because I never diverged from it. When amateur players find themselves in the same group as power hitters, they often push themselves to do the same, resulting in their plays falling to pieces. This is a classic case of a golfer being unable to stick to his/her own playing style. On the other hand, elderly golfers who cannot even hit 180 yards with a driver can play coolheadedly and still achieve good scores. That is because they are focused on playing their own style of golf and are unaffected by those around them.

Nervousness and Excitement Point to a Serious and Positive Attitude Toward Improvement

In terms of techniques for controlling pressure, the most effective method that you can take is to create and stick to the same pre-shot (and pre-putt) routine. Unlike games like tennis and baseball, the golf ball is stationary before you hit it. Therefore, if you can achieve the same setup each time, you increase your rate of success.

There is also a method for recreating situations in which you are under pressure. One way is to keep practicing your putting strokes by seeing how many times you can consecutively sink a ball in the cup. For example, you can decide that you will not leave the practice green until you sink three 1-meter putts consecutively, which would place a lot of pressure on your attempt to sink the third putt. It helps you develop mental toughness by recreating the pressure you might feel in actual play.

Playing as a professional golfer, I have faced countless times when I felt both nervousness and excitement due to pressure. I am of the strong belief that feeling that nervousness and excitement is proof that you have a positive attitude and desire to improve your game.

I think that I would retire as a professional golfer if I ever stopped feeling such nervousness and excitement under pressure. There is nothing wrong with feeling that way. Pressure is something that can be enjoyed—I hope that you will continue playing golf with that kind of attitude.

IT Insight

Noriyuki Yoshida
Editorial Writer
The Yomiuri Shimbun

Yoshida covered basic science, space, nanotechnology, the environment and other topics as a writer for the Science News Department. He is currently interested in artificial intelligence, safeguarding privacy on the internet and other matters.

This issue's number is...

11 dimensions

The number of dimensions according to superstring theory

What do you get when you add 1, 2, 3 and other numbers in order up to 10? You could make repeated additions, but many of you probably remember an easy calculation method from your childhood days (the answer is at the end of this article).

So what happens if we substitute a figure of infinite value instead of 10? We cannot use the same calculation method that we did for finite numbers. Surprisingly, the 18th century mathematician Leonhard Euler used the techniques of complex analysis to derive an answer of "-1/12." This is an important instrument that brings us to this issue's number: "11 dimensions."

What exactly are "dimensions?" One easy-to-understand explanation is "the number of numerical points necessary to determine the position of something." The first dimension is a straight line where location is determined by distance from the origin. The second dimension is flat with vertical and horizontal axes, while the third dimension adds an additional height axis. We live in a space of three dimensions, and by adding time we arrive at the spatiotemporal fourth dimension. But we cannot fathom the fifth dimension and beyond.

While this might be a stretch, one database sample possesses numerous field attributes (dimensions) such as date, location, age, and quantity, and by applying these respective numerical values, one may be able to determine location in the data space as we do for objects in other dimensions. However, it would be correct to point out that data attributes are unrelated and thus essentially not analogous to spatial dimensions.

Coming back to the earlier point, "superstring theory," which probes the extremities of space, presents this kind of world.

When looking at what matter is comprised of, there are atoms, nuclei, particles and even smaller particles. There is a school of thought that believes there is an even smaller ultramicroscopic type of matter known as "strings," hence the theory name. A wide variety of matter appears through the varied vibrations of these strings.

The string vibrations increase in integer multiples of 1, 2, 3, and so on. Vibrations are also energy, so we can say they are also connected to mass.

Let us apply superstring theory to a formula that determines the mass of light. Omitting the details, the formula is displayed as:

$$2+(\text{number of dimensions}-1)\times(1+2+3+\ldots)\times 3=0$$

(1+2+3+...) represents the part that equals the number of vibrations. Here we will substitute Euler's answer of "-1/12." Since light has zero mass, we can derive the number of dimensions to be nine.

But the reality of the world is three dimensional. What about the other six dimensions? We can use the example of a tightrope to illustrate. A person walking a tightrope can only move forwards or backwards on a straight line, so is in a one-dimensional world. But if there is an ant crawling atop a rope, it can move backwards, forwards, left and right on a flat plane, so it is aware of a two-dimensional world. In other words, the ant sees things on a flat plane that are hidden from the person on the tightrope.

The spaces of the remaining six dimensions are extremely small to the point that they are unrecognizable, but intertwined in the space of the three dimensions. While it sounds like it all falls into place too conveniently, this concept can be proven mathematically.

In the nine dimensions of superstring theory, there is an added dimension for special cases when forces between strings become strong: the 10th dimension. And there is a spatiotemporal 11th dimension when time is added.

The idea of increasing and decreasing space is beyond our imagination. In his writings, theoretical physicist Hirosi Ooguri said that "space is an illusion."

Superstring theory is still at the theoretical stage, so testing it is a long way off. However, just as maintenance of accuracy essential to today's global positioning system (GPS) is derived from Einstein's theory of relativity dating back 100 years ago, it might be possible to apply superstring theory to actual technologies in the future.

It is exciting to think about how and when superstring theory will appear in reality.

Answer for total from 1 to 10: By adding in the pattern of 1+10=11, 2+9=11 and so on, there are five sets of numbers that add up to 11, so 11x5=55

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Best Engine

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