Yokogawa Electric Corporation

IR Briefing Session

March 15, 2021

Event Summary

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[Venue]	Webcast

[Participants]

[Number of Speakers]	3	
	Tsuyoshi Abe	Senior Vice President, Head of Marketing Headquarters
	Hiroshi Nakao	Vice President, Head of Life Innovation Business Headquarters
	Hirohiko Nakatani	Department Manager, Treasury & Investor Relations Department

Presentation

Kobayashi: Now, we will begin the Yokogawa Electric IR briefing session.

Everyone, thank you for joining us today while you are busy.

I would like to introduce today's attendees. Mr. Abe, Senior Vice President, Head of Marketing Headquarters. Mr. Nakao, Vice President, Head of Life Innovation Business Headquarters. Mr. Nakatani, Department Manager, Treasury and Investor Relations Department. I am Kobayashi and will serve as moderator today. Thank you.

First of all, Mr. Abe will explain the challenges in the field of life innovation to solve global issues. Next, Mr. Nakao will explain the progress and initiatives of the Life Innovation Business.

We have updated a part of the Mr. Nakao's materials posted on the website last Friday. Please check the latest information on the screen or on the website.

We will accept questions in a lump after Mr. Nakao's explanation, but as I told you in advance, we are sorry that we cannot accept questions by phone or chat because we use the hand raising function of Teams. Thank you for your understanding. The end time is scheduled to be around 12:00.

Now, Mr. Nakatani will say a few words.

Nakatani: Good morning. Thank you for joining us today while you are busy.

Just two years ago, in December, we held a Sustainability Meeting and at that time we first explained the direction and activities of the life innovation business as an introduction.

This time, we want you to deepen your understanding of our efforts in the bioeconomy field, focusing on the background and progress.

In addition, we would like to continue to provide such opportunities in the future, so we would appreciate your feedback, frank opinions, requests, etc., including via the questionnaire.

Now, Mr. Abe will explain.

Abe: Good morning everyone. My name is Abe and I am in charge of the Marketing Headquarters at Yokogawa Electric. I am pleased to meet you, today.

First of all, I would like to talk about Yokogawa Electric's next three to five years. After that, Mr. Nakao will talk about next three years.

I would like to talk about what Yokogawa is doing in the field of life innovation, as challenges in the field of life innovation to solve global issues.

Profile

Tsuyoshi "Ted" Abe, Ph.D.

Senior Vice President & General Manager of
Marketing Headquarters, CMO
Yokogawa Electric Corporation

Joined Intel K.K. in 1985 and held various posts such as the head of Intel Architecture Technology Headquarters (HQ), Marketing HQ, and Technology & Manufacturing HQ before being appointed vice president and board director.

Moved to Yokogawa in 2016 as the head of the Corporate Marketing HQ, and consolidated not only conventional marketing communication, brand, and digital marketing functions, but also R&D, M&A, strategic IP management, new business development, corporate business planning, strategic standard management, government affairs and open innovation within the marketing function.

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2

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Please refer to my profile later.

Currently, I am in charge of the Marketing Headquarters, but this is unlike normal marketing headquarters and consists of R&D and various other divisions. So today, the part of R&D will be included in my speech. Thank you.

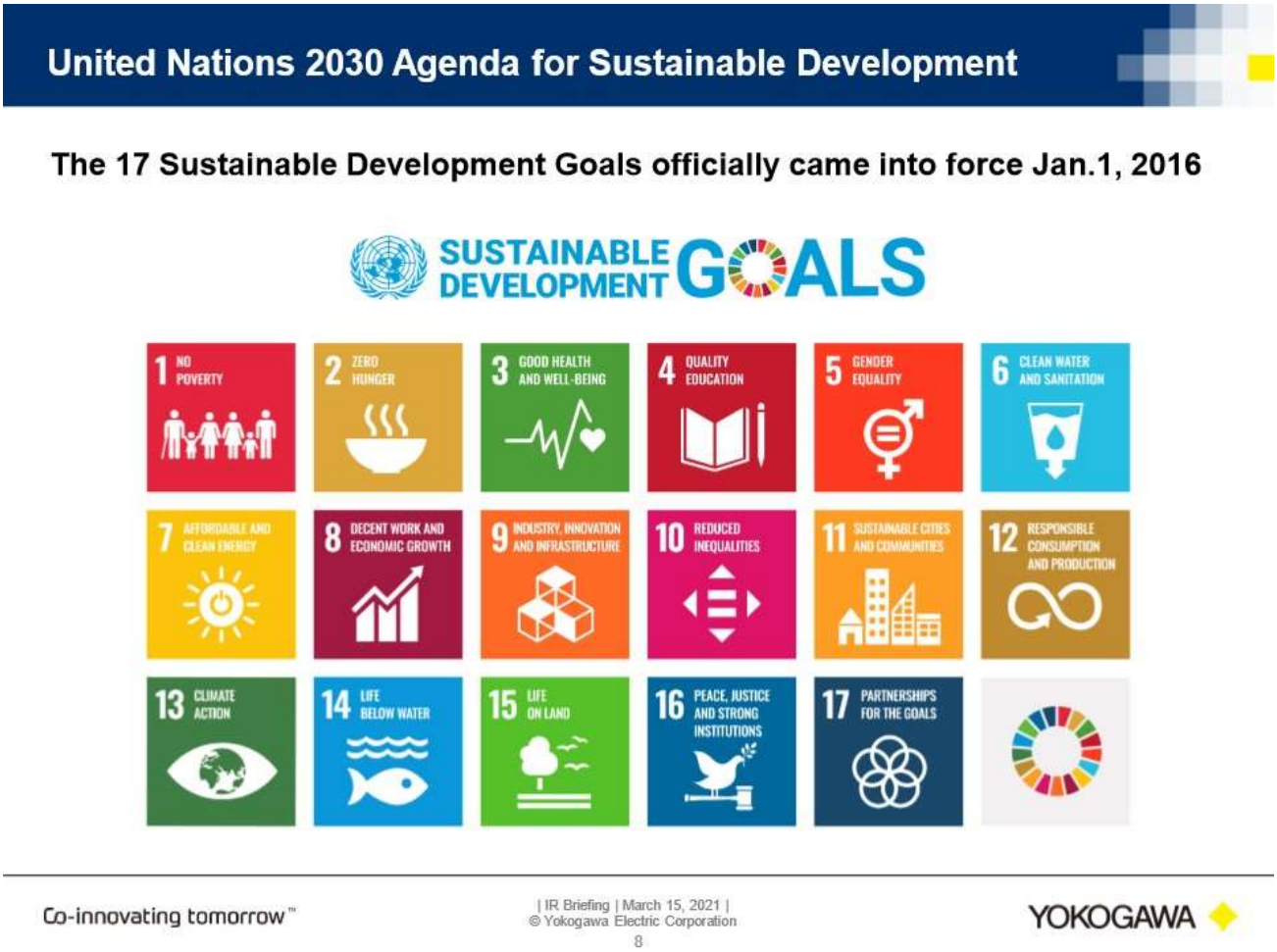
There are agendas, numbers 1 to 5.

The first agenda is global issues. I would like to take a bird's-eye view of the world with you. Today, the world and society face various challenges.

The challenges include terrorism, cyber security, and population explosion. There are also issues such as aging worldwide, especially in developed OECD countries, or race conflict, territory, and recently nationalism, as a movement to counter globalization. Others are health-care issues, human rights issues, and climate, weather abnormalities, as you know.

The three issues that Yokogawa is paying closest attention are water, food, and energy. We see that these three important resources for humankind cause shortages in a chain reaction.

Especially, as indicated in yellow, we will contribute to the seven issues: cyber security, triple shortages, population, climate change, and aging.



The current mid-term business plan, TF2020, will end this month. In April, from the next fiscal year, a new mid-term plan will start. The current plan is completely fully aligned with the SDGs17 announced by the United Nations.

Among the SDGs, I would like to talk about the sixth part relating to water.

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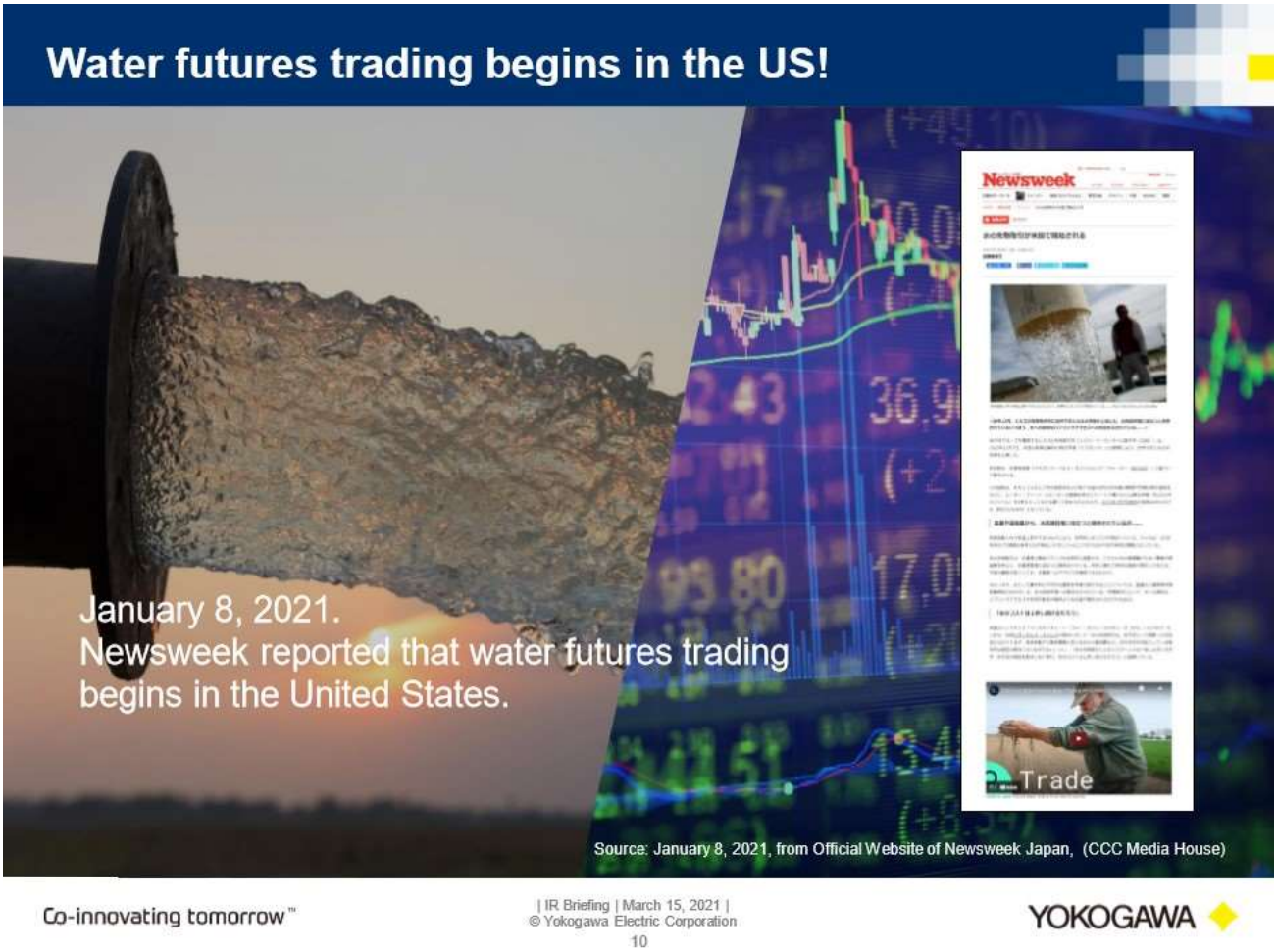
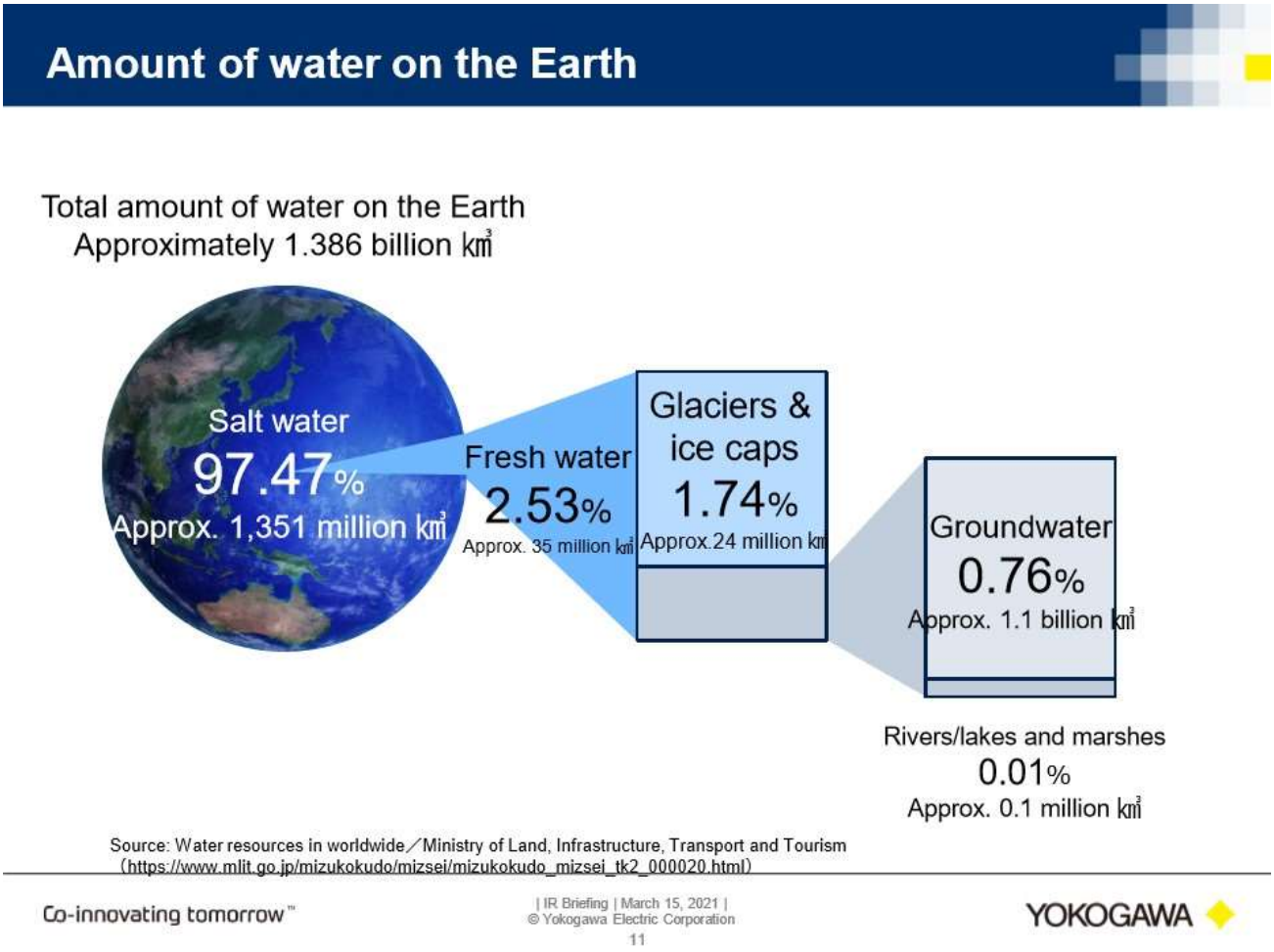
The theme is “A water management that is friendly to people and the environment.”

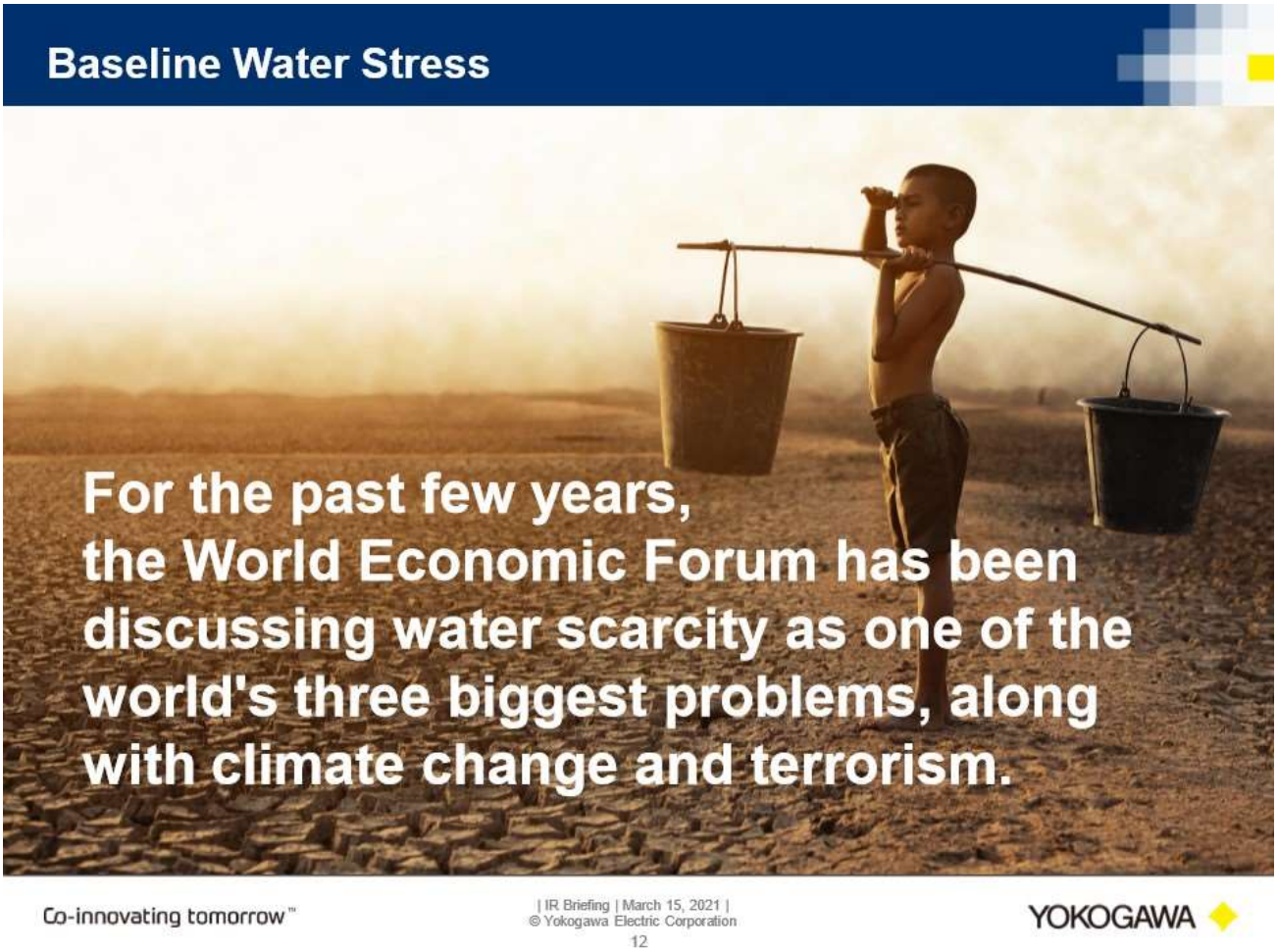


On January 8 this year, Newsweek reported that water futures trading begins in the United States.



The amount of water surrounding the Earth is surprisingly small.

Seawater accounts for 97.47%, about 98%, of all water on the Earth. If we break down this, the one close to fresh water that can be drunk immediately is only 0.01% of the total water on the earth.



Now we have a population of 7.5 billion, and the issue of whether the current water environment can withstand the age of 10 billion people is a big social issue. Therefore, the Davos Conference, the World Economic Forum, is being held every January. In recent years, along with terrorism and climate change, the water shortage has been regarded as one of the world's three major problems.

Case: Water shortages worsen in the United States

- 36 of the 50 states have water shortages.
- Las Vegas depends on Lake Mead, a man-made lake 24 miles to the southeast, for its water.

1995 → 2007

Photo courtesy: Japan Society of Civil Engineers, JSCE Library

You see some cases. This is a case in the United States.

There are 50 states in the United States, but 36 of them are already suffering from water shortages. Especially on the West Coast, where you often go, or in the Midwest. Also, dams are becoming decrepit. A lot of dams, including the old Hoover Dam, were built 40 or 50 years ago, and as you can see, the amount of water itself is also decreasing.

Case: The Yellow River, a river that does not reach the sea

- Many huge dams have been constructed in the upper and middle basins.
- As a result, the area of irrigated land threatened by salinization due to long-term irrigation is increasing, and the water pollution of the Yellow River due to agricultural and industrial wastewater has become severe.

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Not only in the United States, but also in China. Recently, it has come to be said that the Yellow River does not reach the sea.

In the Yellow River, there is a dam called the Sanmenxia Dam, and there are several other dams. But even if there are dams, as you can see, there is almost no water near the estuary and the sea. Along with the problem of water quantity, there is also the problem of water quality, which is a big problem for China.

What is virtual water?

A concept proposed by Dr. Anthony Allan, Professor Emeritus, Department of Oriental and African Studies, University of London. It is an estimate of the amount of water needed to produce the food that a country imports (consumer country).

- It takes 1,800 liters of water for irrigation to produce 1 kg of corn.
- Cattle consume large amounts of grain: it takes about 20,000 times as much water to produce 1 kg of beef.
- By importing food from overseas, Japan can avoid using water for its production. In other words, importing food is importing water in a different form.

Source : Ministry of the Environment Government of Japan (https://www.env.go.jp/water/virtual_water/)

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Fortunately, Japan is a country with abundant water, and we can drink tap water, so I do not think there are any people who have troubles with water in their daily lives.

There is the idea of virtual water. To put it simply, no matter what you make, you naturally need water. For example, to make 1 kilogram of corn, you need 1,800 liters of water, and to make 1 kilogram of beef, you need 36 million liters. Water is needed in the background.

For example, although it is not written here, you probably usually eat foods such as beef bowl and curry rice. About 1 ton of water is needed to make one cup of that. The capacity of the bathtub in your home is about 200 liters. So you need five tubs of water for one beef bowl and one bowl of curry rice.

When it comes to this idea of virtual water, Japan is the second largest consumer of water resources in the world after the United States. In a sense, it is not an exaggeration to say that we are importing water. Fortunately, Japan has not had much trouble with water so far, but in the future, we have to deal with this issue based on the idea of virtual water.

Changes in water-related social trends

Water is considered an essential resource, and a greater emphasis is being placed on its efficient use and continued compliance with environmental regulations.

- Global sustainability initiatives (SDGs)
- The trend toward stricter regulations

SUSTAINABLE DEVELOPMENT GOALS

	Amount used	Regulation	Typical regulatory targets	Reference
Developed countries	large	strict	**Environmental regulations**	Increased facility maintenance stress
Emerging countries	↑	↑	**Tighter effluent standards**	Tighter regulation in China and India
Third countries	small	loose	**Detoxification of drinking water**	

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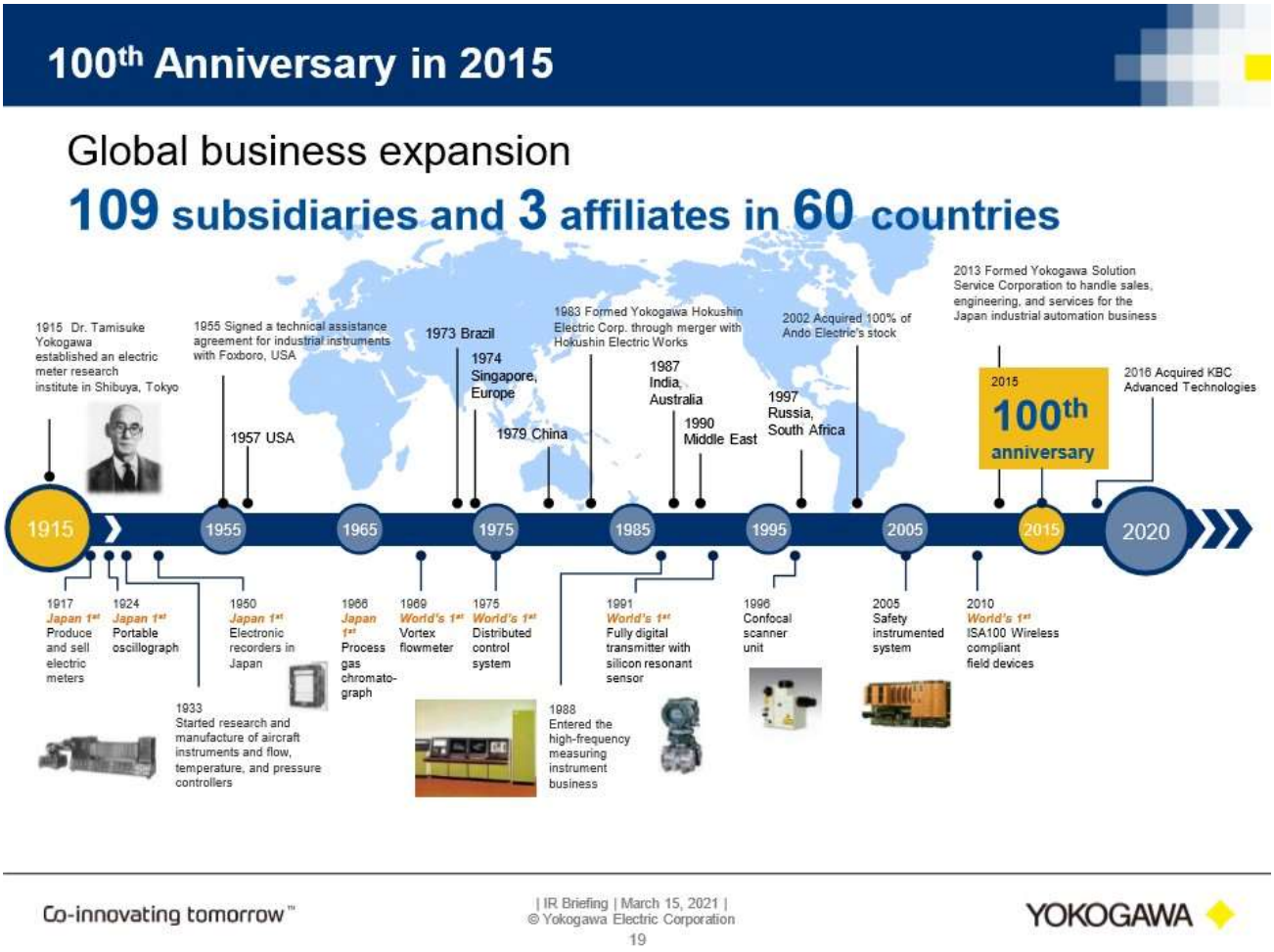
The social trend regarding water has changed significantly in recent years. In emerging countries or third countries, there were water problems, partly because of the weak water infrastructure, but recently, water issues in developed countries have come to be highlighted considerably.

Naturally, developed countries have a large population and well-developed industry, so they use a lot of water. Regulations are becoming stricter and stricter. The regulations, especially related to sewage, including returning sewage to clean water, are changing in the United States and are about to change significantly in the world. Such a big challenge relating to the water environment is emerging.

Therefore, to prevent the earth from drying out, we also consider this water problem as a major goal for Yokogawa to contribute in the future.

The second agenda is Yokogawa's core competencies and goals for contribution to society.



Yokogawa started its business in 1915, the second year of World War I. Tamisuke Yokogawa is the founder. This year, Yokogawa will be a 106-year-old company.

In the 106-year history, Yokogawa has gone through a strategic turning point twice. We have changed our business portfolio significantly. Yokogawa Electric has three core competencies today.

First, measurement. In other words, it is sensing technology.

Second, after measuring, control. The DCS (distributed control system) was first developed by Yokogawa Electric in the world. After measuring, we visualize what cannot be seen and control it.

Third, information and data obtained from it.

Based on these three core competencies, we analyzed the challenges of the 17 SDGs. As a result, as you see, we have come to the conclusion that we can contribute to these eight tiles.

Therefore, regarding the current Yokogawa Electric's medium-term business concept and long-term management concept, these SDGs are quite strongly focused.

United Nations 2030 Agenda for Sustainable Development

Sustainable Development Goals related to Yokogawa's business

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As a result of further analysis, we now have the idea that Yokogawa can contribute to 12 tiles. The three core competencies can be diverted to the additional tiles. We believe that we can expand these areas.

About four years ago, Yokogawa announced the Three goals, as a vision of a society that we are aiming for in 2050.

The environmental goal is net-zero emissions. The social goal is well-being. The economic goal is circular economy. Four years ago, we made a decision and made public that we will challenge these three goals with numerical goals toward 2050.

The third agenda. Based on these backgrounds, we decided to take on the challenge of the field of biology in the future.

Three themes

Long-term business framework

Biology Universe Oceans

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First of all, I would like to talk about the long-term business framework.

In creating this long-term management concept, we put three themes on the table.

The first is biology. The second is universe. The third is under the oceans. We put these three themes about four years ago. We decided to challenge these three as a long-term management concept for Yokogawa Electric.

Of course, we wanted to do all three at the same time, but due to the limited resources, we are now working on the first one, the fields of biology.

Yokogawa's goals

2030

SDGs

Global Goals for 2030

Sustainable Development Goals

2050

Three goals

Yokogawa's Goals for 2050

Three goals

Yokogawa will work to achieve net-zero emissions, ensure the well-being of all, and make a transition to a circular economy by 2050, thus making the world a better place for future generations.

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As I mentioned earlier, always keeping in mind the SDGs for 2030 and Yokogawa's goals for 2050, we will pivot three core competencies of measurement, control, and information.

We never think that the challenge to biology is not deviating from Yokogawa's current business and core competencies. Until now, with three core competencies, we have contributed mainly to the hydrocarbon area, oil and gas, and chemicals.

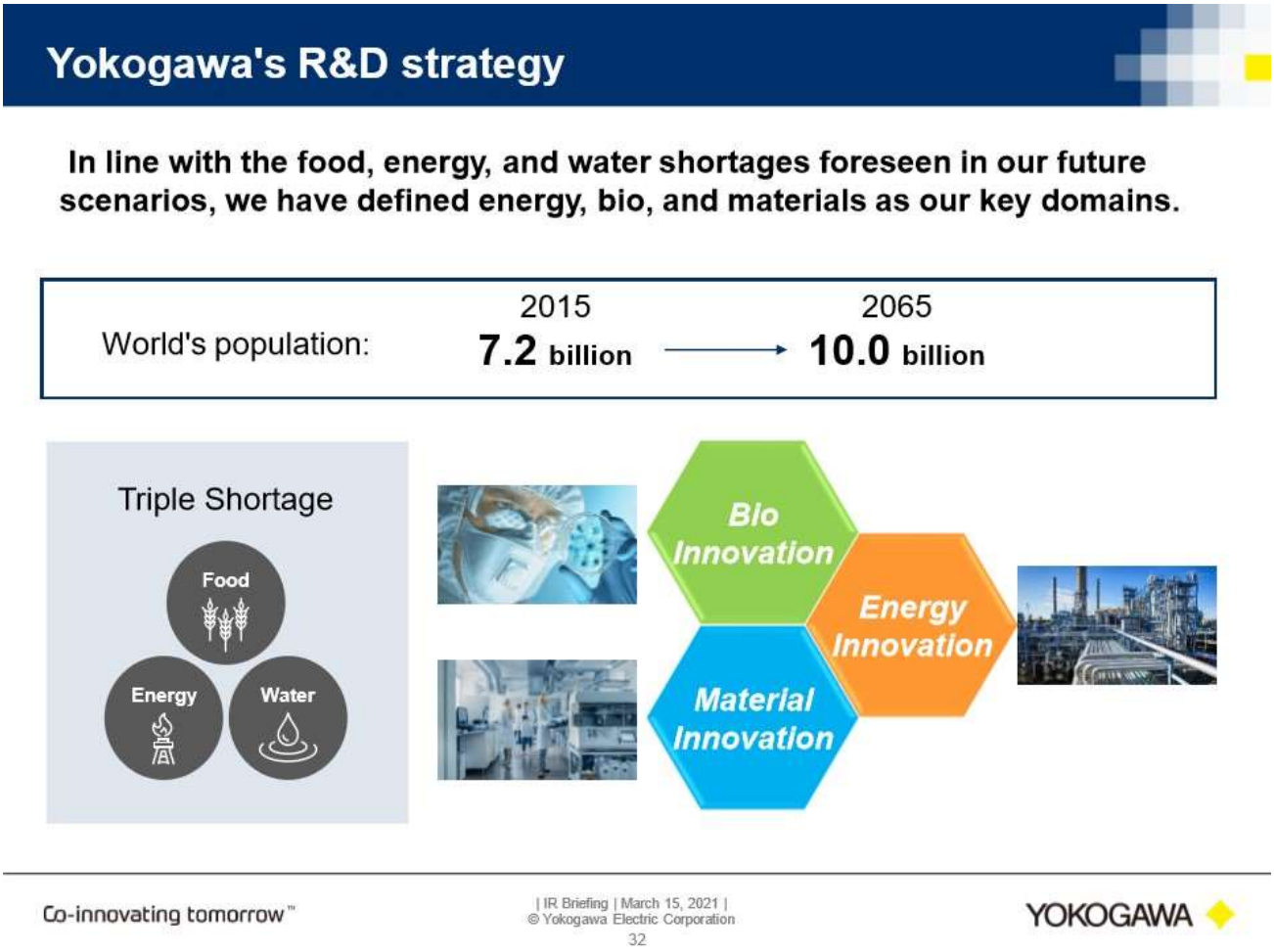
In particular, we have contributed to the development of the energy industry and the chemical industry, but from now on, we will use three core competencies to contribute to the field of biology.

Today, we will focus on Yokogawa's challenge to life innovation and safety, such as medical care and food.

The fourth agenda is Yokogawa's strategy in the biology field. We would like to share three topics today.

I think that you are sick of hearing the word digital transformation, but there are so many technologies.

One thing we have to think about is that these technologies will begin to merge further toward 2030. These technologies will now start collaborating with each other. Then, one day, suddenly, a tipping point will be reached and it will be possible to solve something that could not be done until now. I believe that it will be the next ten years that we enter such an era.



Amid these circumstances, we face the population problem as one of Yokogawa's R&D strategies. It is said that the world's population was 7.2 billion in 2015 and will be 7.5 billion in 2021, but it will probably exceed 10 billion after 2065.

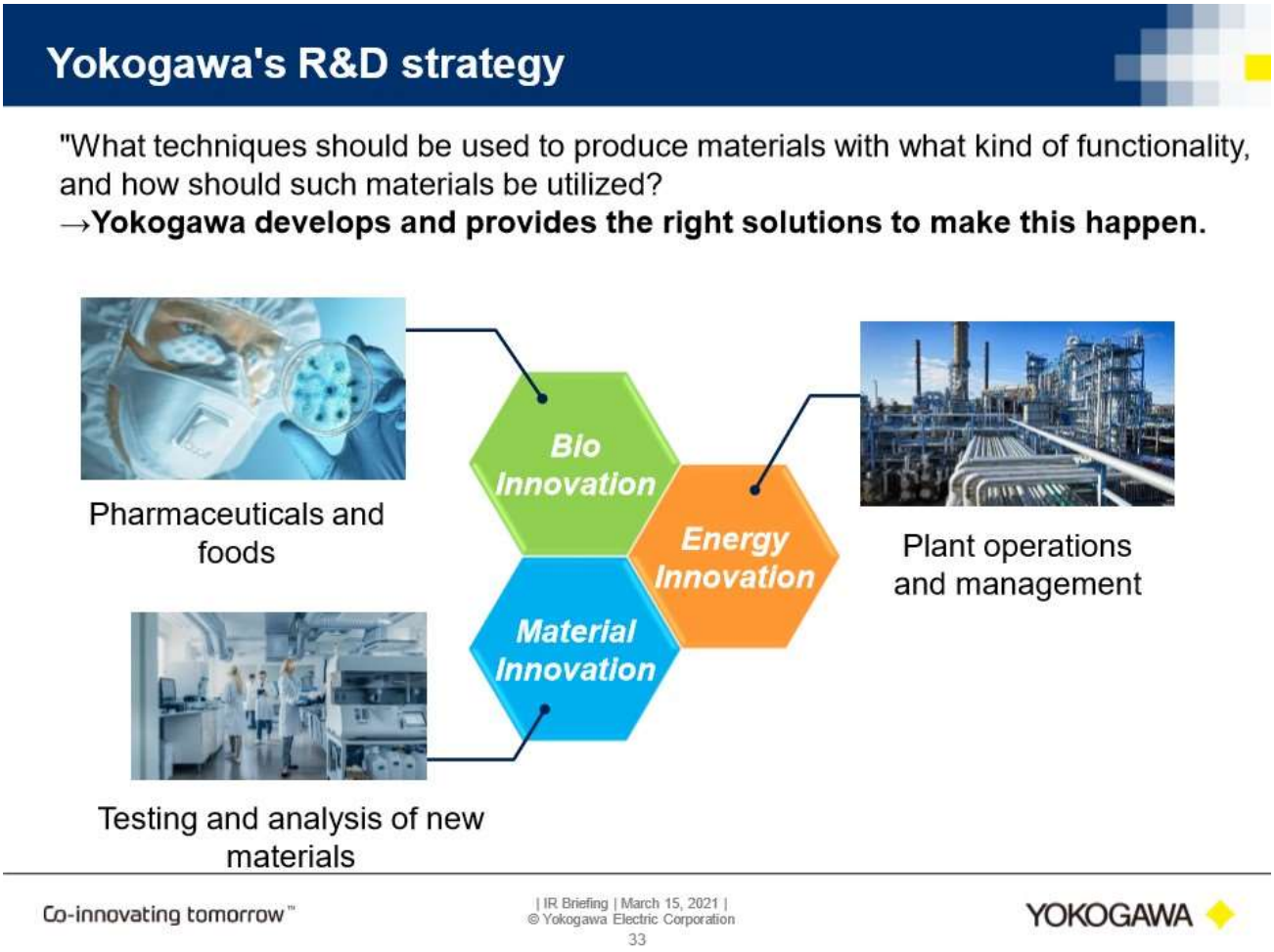
As a result of scenario planning, we found out Triple Shortage, food, water, and energy. We thought what we can do about it.

Now, the Innovation Center, our R&D entity, is doing R&D by dividing into three themes: Energy Innovation, Bio Innovation, and Material Innovation.

The Energy Innovation is Yokogawa's core business, Industry Automation. This is an area of implemental innovation for the aim of contributing to the process automation industry.

On the other hand, the bio and material innovations are Yokogawa's rather destructive innovation than the linear ones up until now.

Currently, there are more than 40 projects running here, and the portfolio is one-third each in three main themes. Bio and Material Innovations will be areas of new challenges for Yokogawa this time. So the ratio the existing core business of Industry Automation and other new challenges is 1:2.



Energy innovation is focused on the plant operations and management. This included two big trends: the flow from Automation to Autonomous and the move of closed plant to open one. In addition, Yokogawa will continue to work on robotics in the future. We believe that there is an innovation headroom here as well.

On the other hand, bio innovation is focused on pharmaceuticals and foods. Material innovation is focused on testing and analysis of new materials.

Two major pathways in the biomass industry

1

Biomass Materials
(Mainly chemical-based methods)

Production of biomaterials from biomass

2

Bioprocess
(Biofunctional production)

Production of biomaterials by means of biological functions

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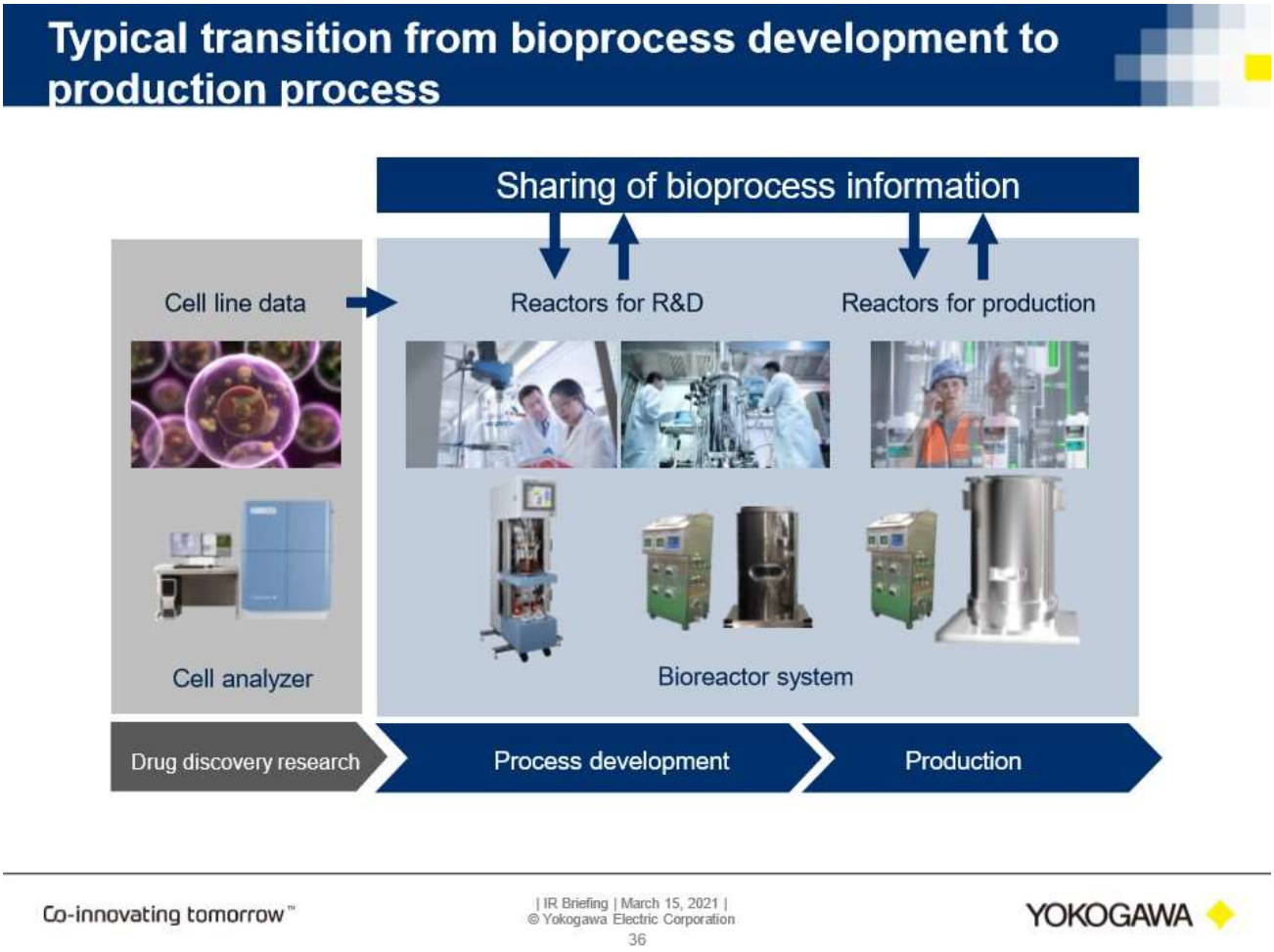
As for the bio, there are various kinds of bio.

In particular, there are two things we are looking at right now. One is the category of biomass materials, and the other is the bioprocess field. The biomass material produces biomaterials from biomass as a raw material. It is an area where biomass is converted into biomaterials mainly using the chemicals during its production.

The second is the bioprocess. This is a field where biological materials are produced by utilizing biological functions. There are these two things. Now we are trying to do both.

In particular, as for number two, there has recently been a word, “biomimic.” We will use the power of living things to create new materials.

Among them, I would like to introduce two things that we are doing now. The first is contribution to high-mix, variable-volume production.

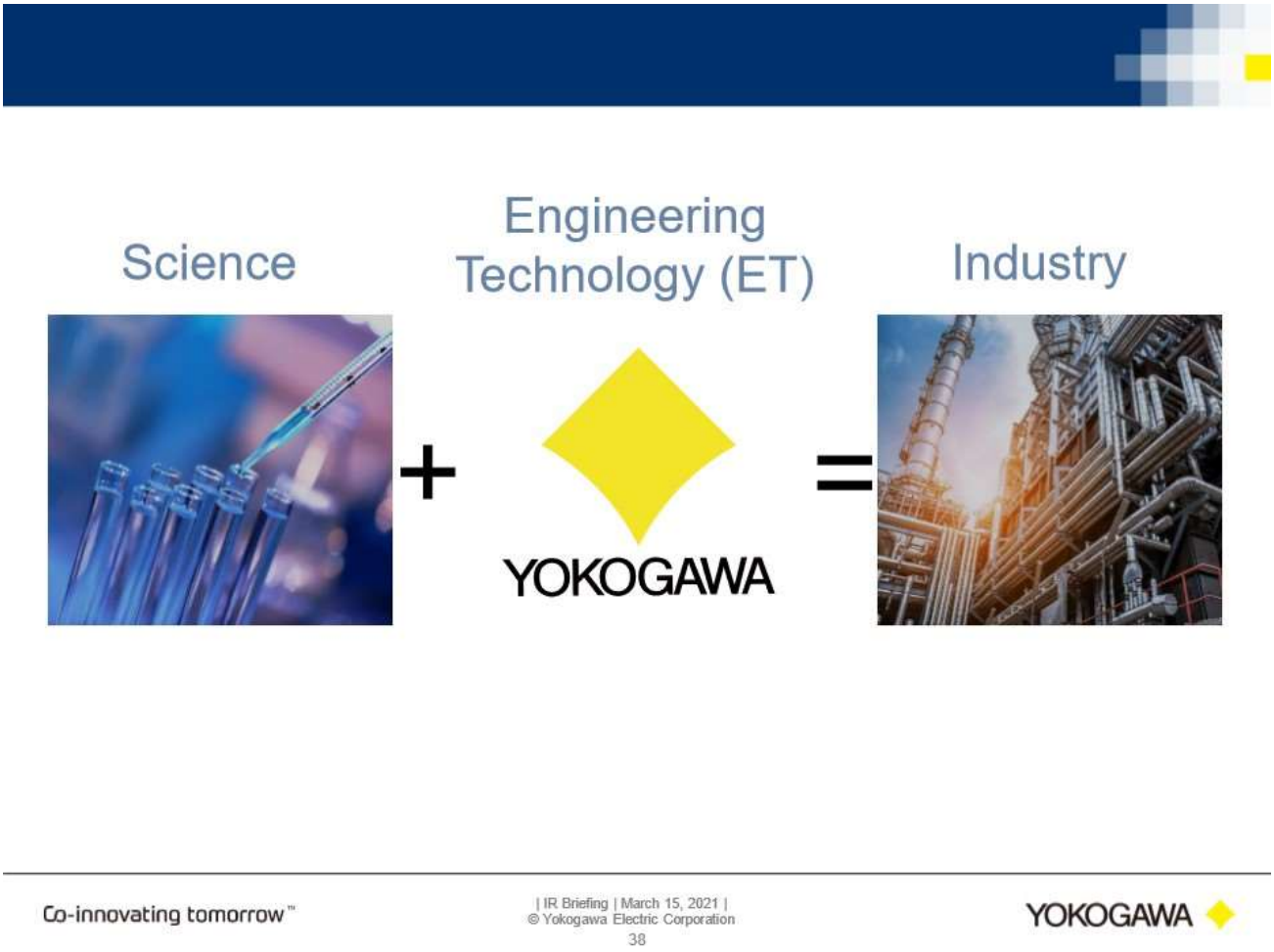


This is existing pharmaceutical flow. It flows from the left.

First, there is drug discovery research and then process development and production. The drug discovery research part is mainly conducted in the laboratory and is the area of science. This process usually takes time in the pharmaceutical world. This part of research takes more than 10 years. When the research is done in the lab, it is necessary to be mass-produced, so it goes into process development and then production.

Yokogawa already has some solutions of these existing flows, so Mr. Nakao will tell you about the current situation as Yokogawa's Life Innovation Business Headquarters.

In terms of drug discovery research, the state-of-the-art biomass technology is still at the level of science. For example, regenerative medicine that will come out later, is still at the level of the research institute. So, something is missing to make it industry.



What currently lacks is Engineering Technology (ET).

No matter how good a product can be made in a research institute, if it cannot be mass-produced, it naturally will not become an industry. What is missing most now is this ET.

Yokogawa has lived in the world of the plant for over 40 years. Therefore, we are proud that we are very good at the ET, both as a technology, as a product, and as an experience.

So, first of all, we would like to add this ET to science in the world of biology and help to launch the new industry of biology as an industry.

What I can talk about in the current R&D today is the contributions in the field of microbial control.

How the ability to measure gene expression at overwhelming speeds contributes to our world

Contributing to safety and security in everyday life with ultrafast DNA sensing

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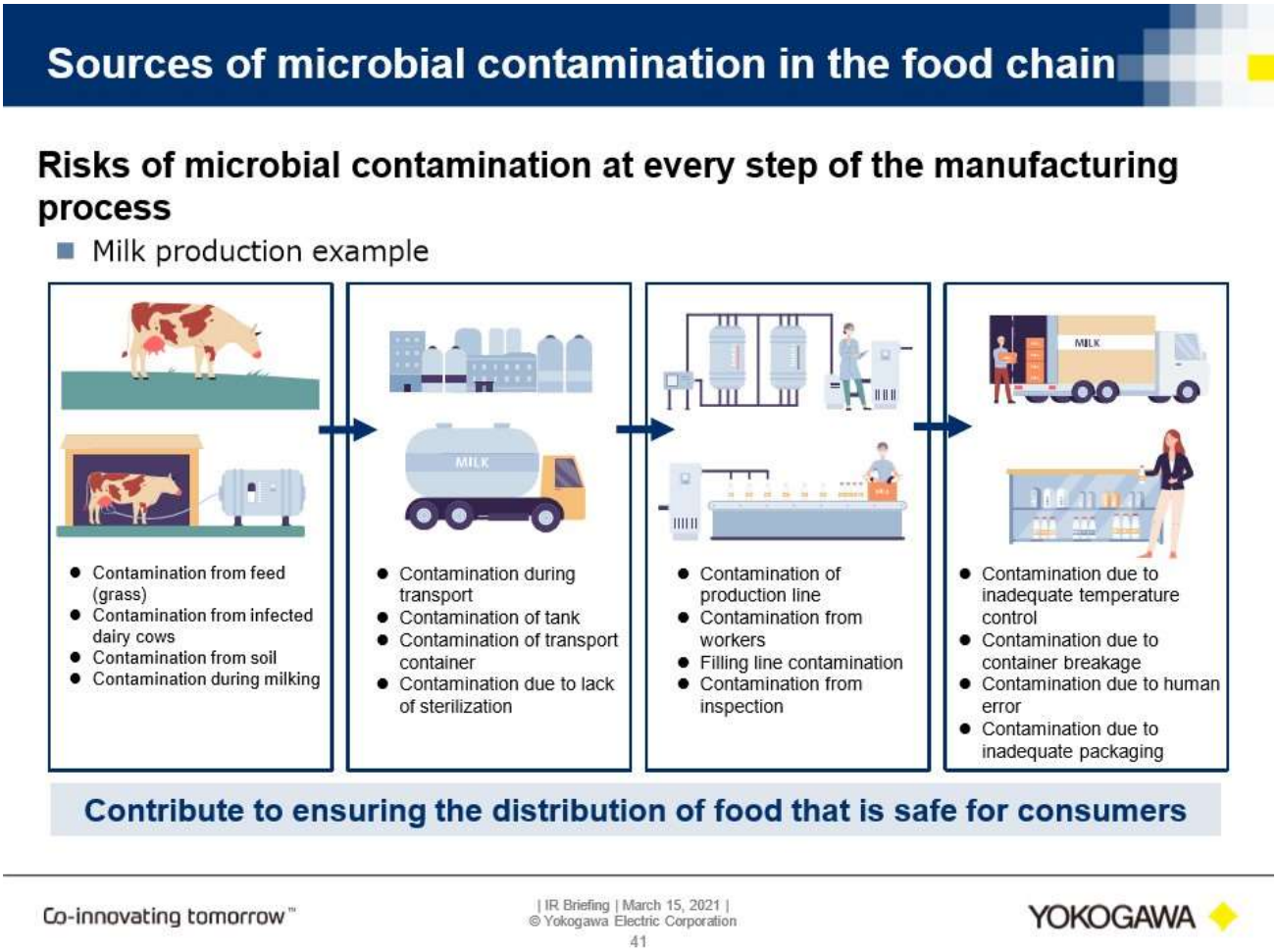
We are now developing a new sensing technology called ultrafast DNA sensing.

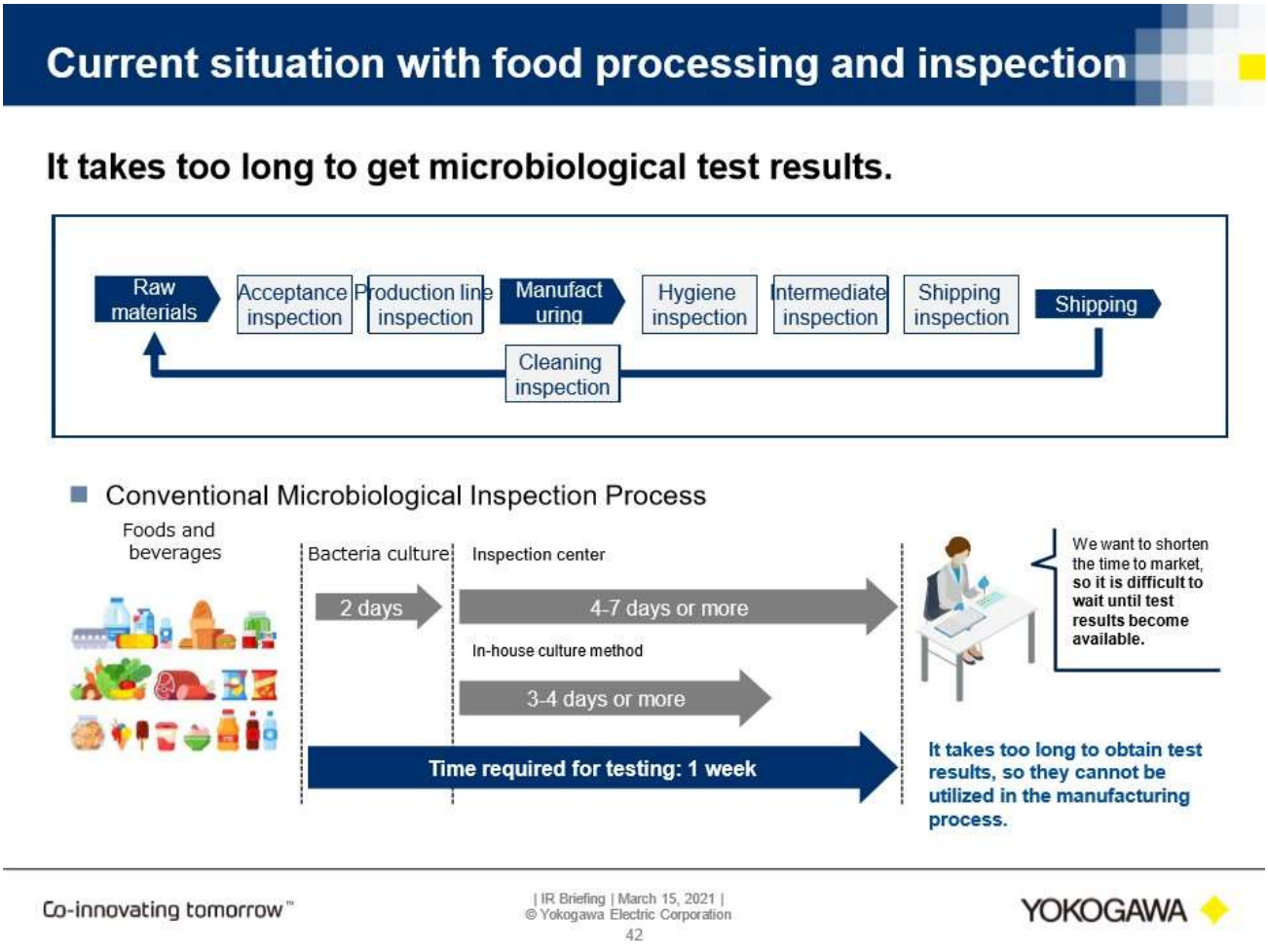
There are many needs for testing in the world, such as various foods testing and the PCR test caused by COVID-19.



The sources of microbial contamination include milk, drinks, alcohol, drinking water, and vegetables. It also includes toothpaste.

Anyway, what humans put in their mouth must be inspected for contamination of microorganisms.

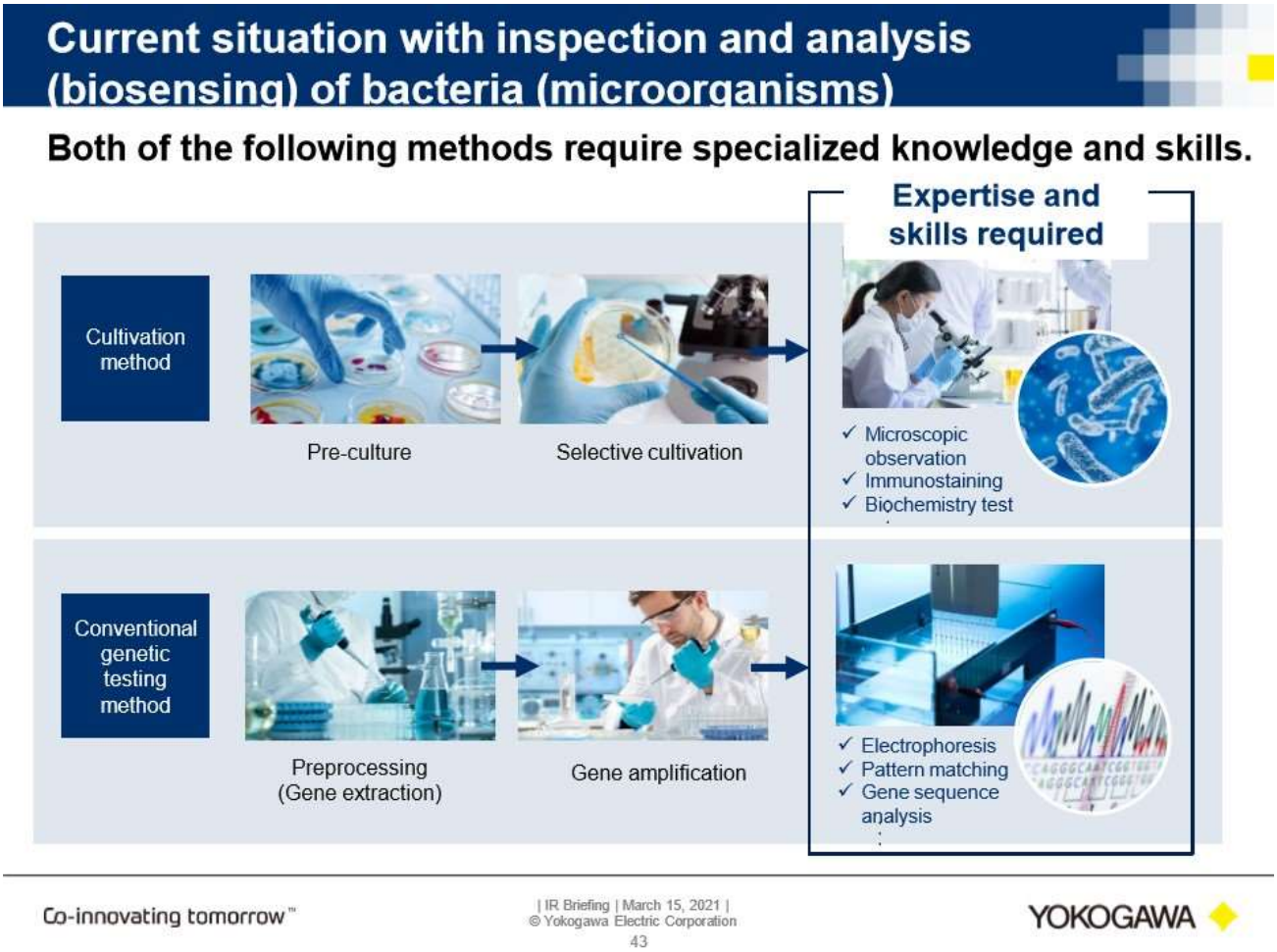
It is impossible that you put a lid on the bottle in the factory and ship it immediately. It is included in the current process that we sample some samples, inspect for contamination of microorganisms, and finally ship the product if there are no problems.



This slide is the actual flow. The upper half of this slide, the process goes all the way to the right from the raw materials to the shipping. Inspection is necessary.

For example, in pre-shipment inspection, some samples are attached to the culture solution in the petri dish. There is a culture process that increases bacteria, and the samples are brought to the inspection center. Now, it takes at least five days, about a week, to get the results of this test.

The one week is a wasted time for companies. This is counted as inventory. So we are trying to get rid of this waste of time.



In addition, the culture method requires a technique. Since it has to be genetically tested, it requires specialization in both of growing bacteria and testing. In other words, this can only be inspected by a person with considerable skill. Not everyone can do it. This is also the problem.

Hurdles to industrial use of biosensing

The inability to perform measurements in real time is a barrier to industrial use. The inspection method has not changed and is too slow.

1928
Discovery of penicillin

2017
Microbiological examination

2017
Molecular biological methods

With overwhelming **speed**, achieving a **revolution** in classical biotech techniques that have remained unchanged for 100 years

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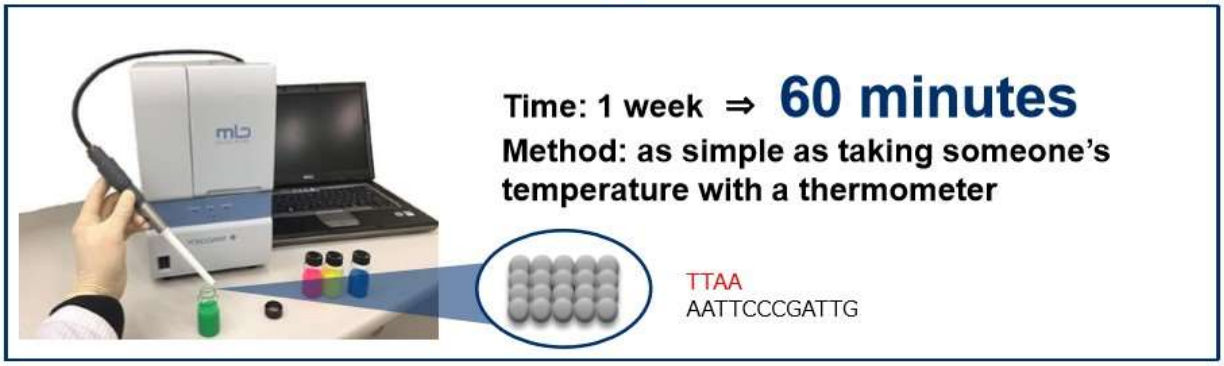
Our goal is to revolutionize classical-biotech, which has remained unchanged for the last 100 years, with overwhelming speed. Simply put, almost nothing has changed in this area since the discovery of penicillin in 1928 and the current era of Reiwa in 2020.

Simplification and speeding up of microbiological testing

Ultra-fast DNA sensing



No culture required

No skills required

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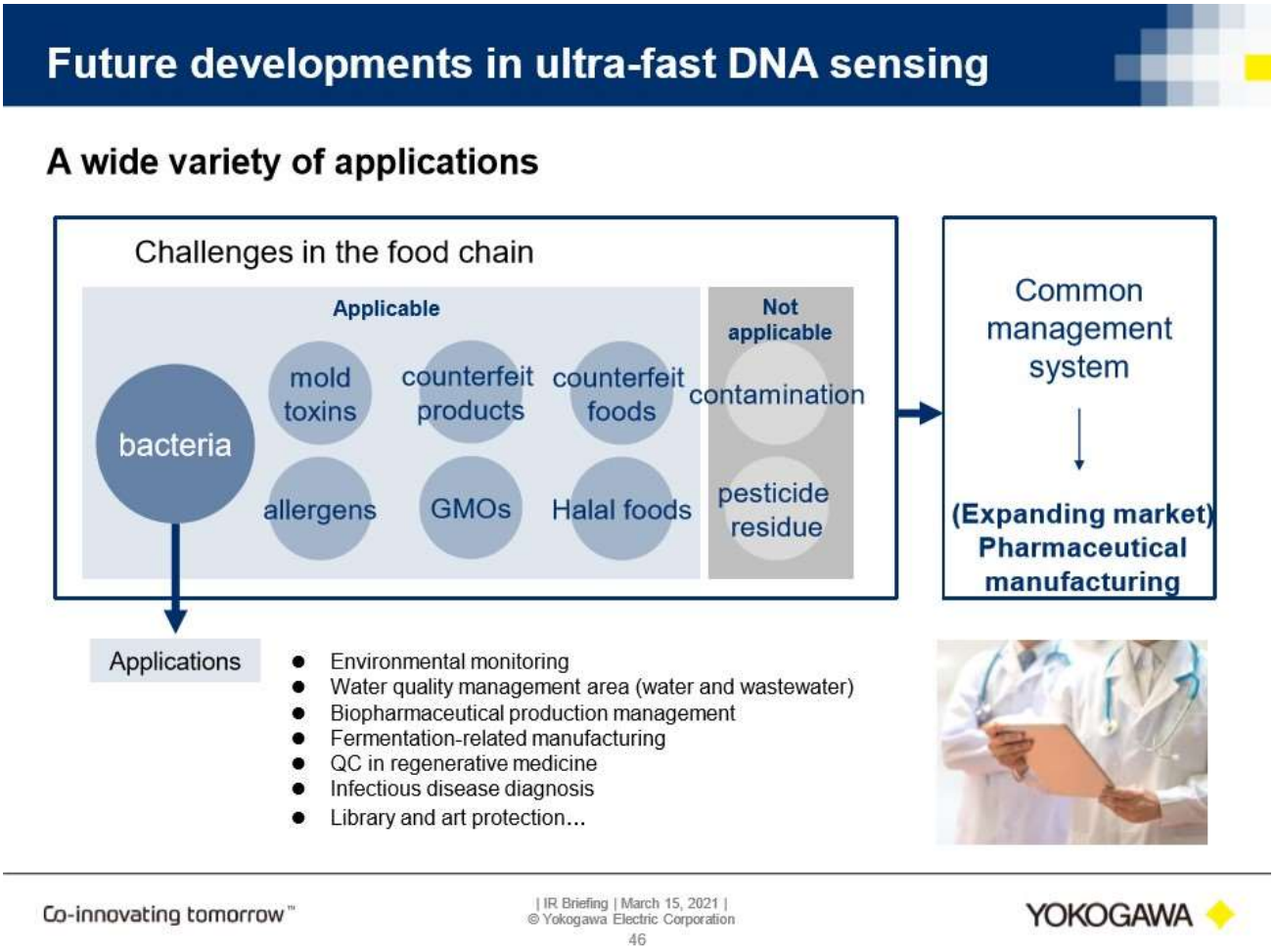
Our goal is to use ultra-fast DNA sensing technology to reduce the time for the microbiological testing from a week to 60 minutes. It also does not need to be cultivated. And it does not require skills. We are currently developing a sensing technology with the aim of providing such an environment that inspection can be made by non-specialists.

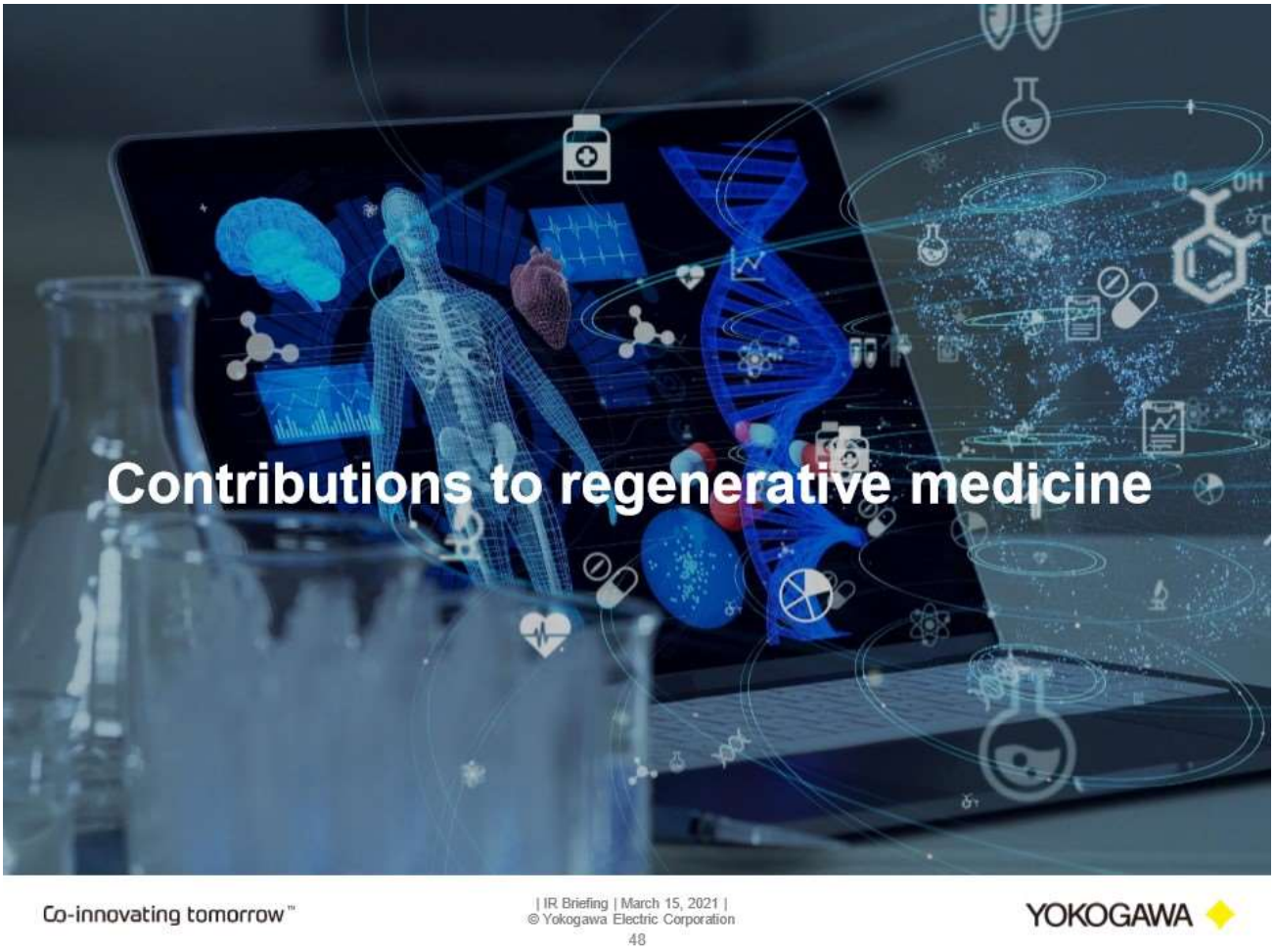


In addition to things that put in mouth as introduced above, we are now aware that there are various application fields for the sensing technology, such as environmental monitoring, clean water and sewage, QC in the field of regenerative medicine and infectious disease diagnosis, just like COVID-19.

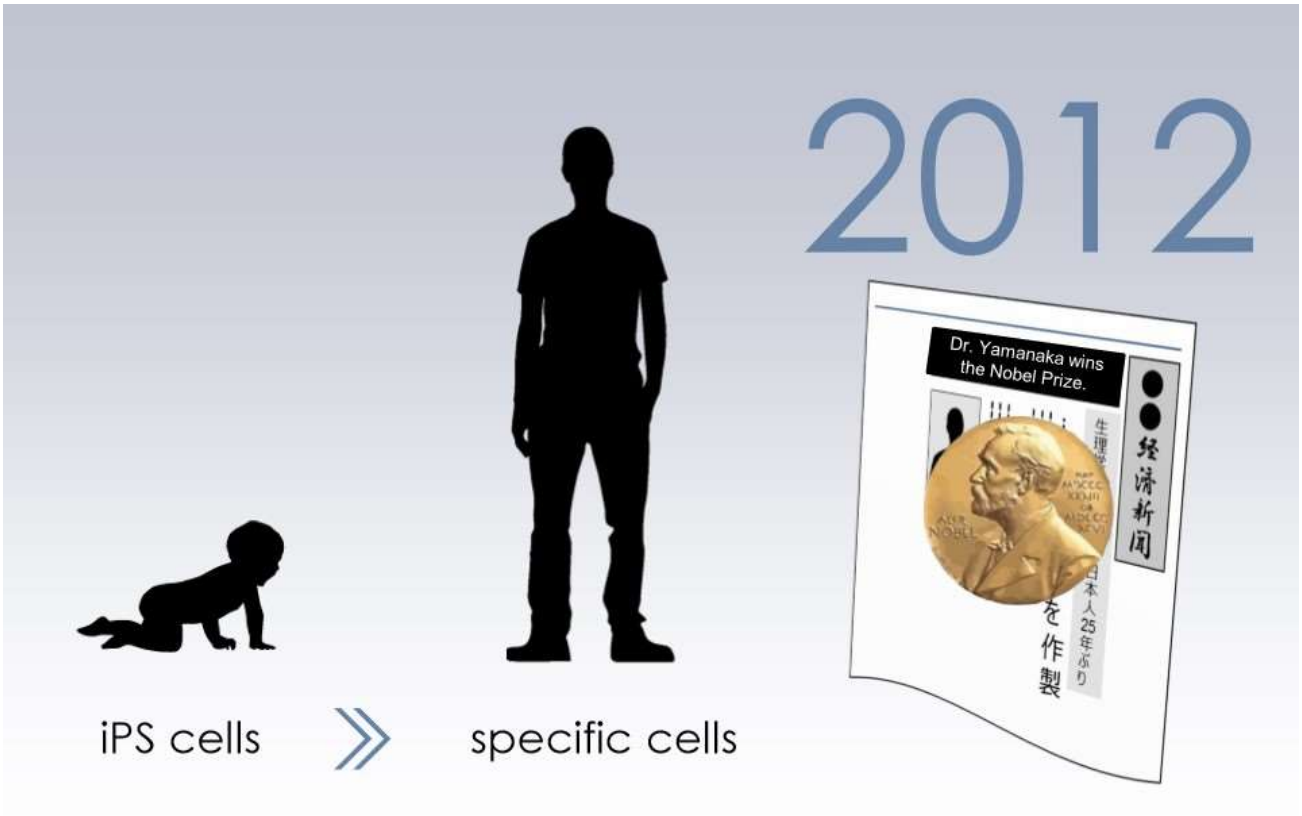
Next is cells. There are about 60 trillion of cells in your body.

Each person has their own DNA, so I do not think it is an exaggeration to say that each person is big data.

There are many organs, but from our point of view, each cell looks like one plant. As the process takes place inside the cell, from our point of view, one cell looks like one plant, which is the concept of the Cell as a Plant.



One of the initiatives of the Cell as a Plant is the contribution to regenerative medicine that we are currently conducting R&D.



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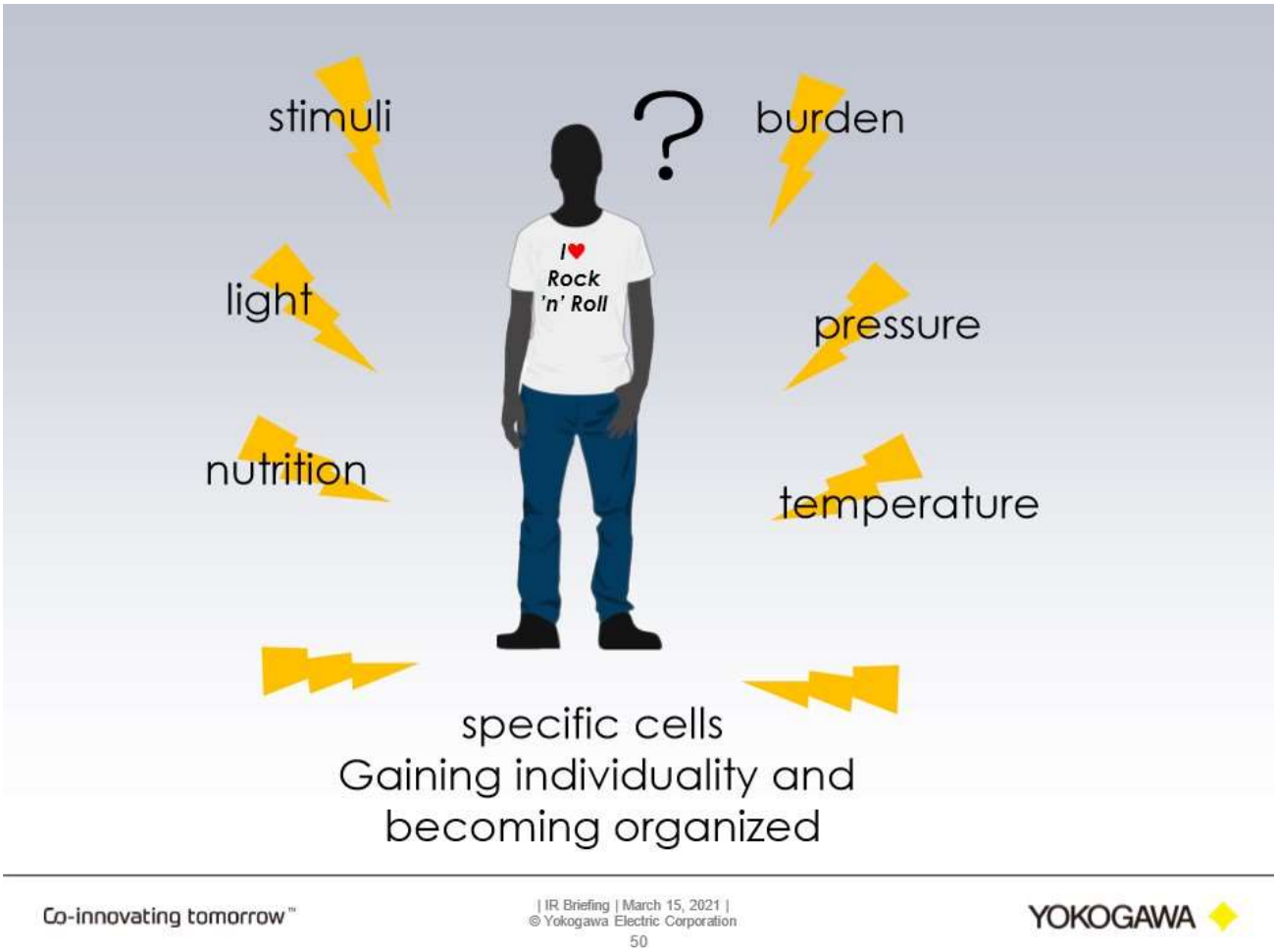
There is an iPS cell first and it became a specific cell. With this, Professor Yamanaka of Kyoto University was awarded the Nobel Prize in 2012.



These specific cells have to be further organized. In other words, in the end, have to make it an organ. It is necessary to first make stem cells into specific cells and then make them into tissue cells.

For that purpose, it is necessary to give various signals and stimuli to this specific cell at an exquisite timing.

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By doing so, various tissue cells will be born and only when they are created will one organ be formed.

Background information (1/2)

There are still many ailments for which only life-supporting treatment is available.
Due to the shortage of donors, there is a long waiting list for transplants.

- Current situation in Japan (e.g., kidney disease)

Life Extension: Artificial Dialysis

- Minimum 3 visits per week
- 4 hours of treatment per visit
- Dietary restrictions

Number of dialysis patients: 215 (1968) → 334,640 (2019)

Japan's contribution: 1.6 trillion yen per year

Treatment: Kidney Transplant

Number of people waiting (Japan): 13,163人 (Dec. 2020)

Average wait time 16 years

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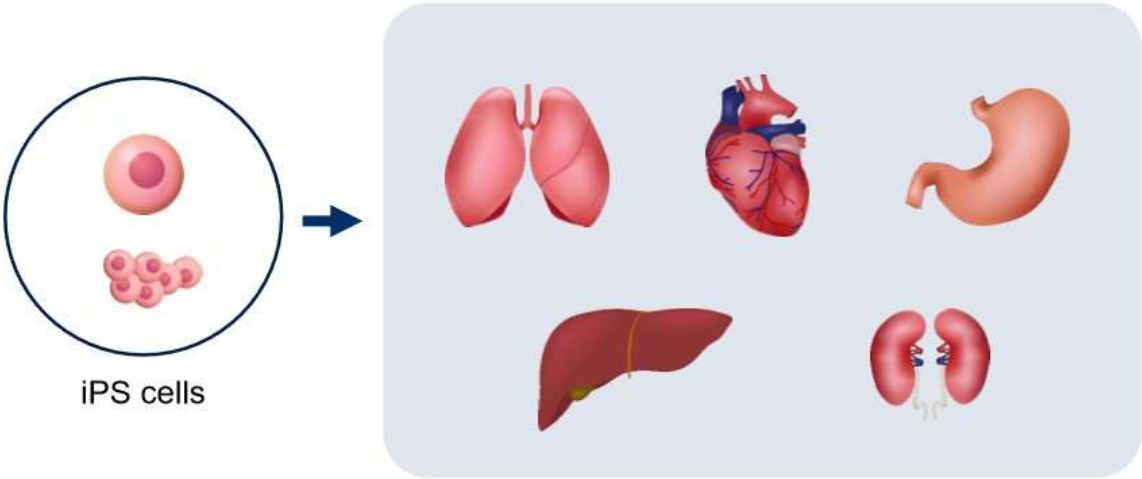
As a path to regenerative medicine, first of all, as you all know, the social background is that the population of dialysis is steadily increasing. As recently reported, the number of dialysis patients in Japan is increasing year by year. The amount of money that the Japanese country is currently contributing is JPY1.6 trillion per year. I think this will increase even more in the future.

There are also many queues for kidney transplantation. Currently, more than 13,000 people are waiting for the organ donation. This number will increase enormously overseas.

Background information (2/2)

For people to receive a transplant whenever it is needed, it will be necessary to create human cells, tissues, and organs using iPS cells.



Improving patients' quality of life, extending healthy life spans, and reducing medical costs

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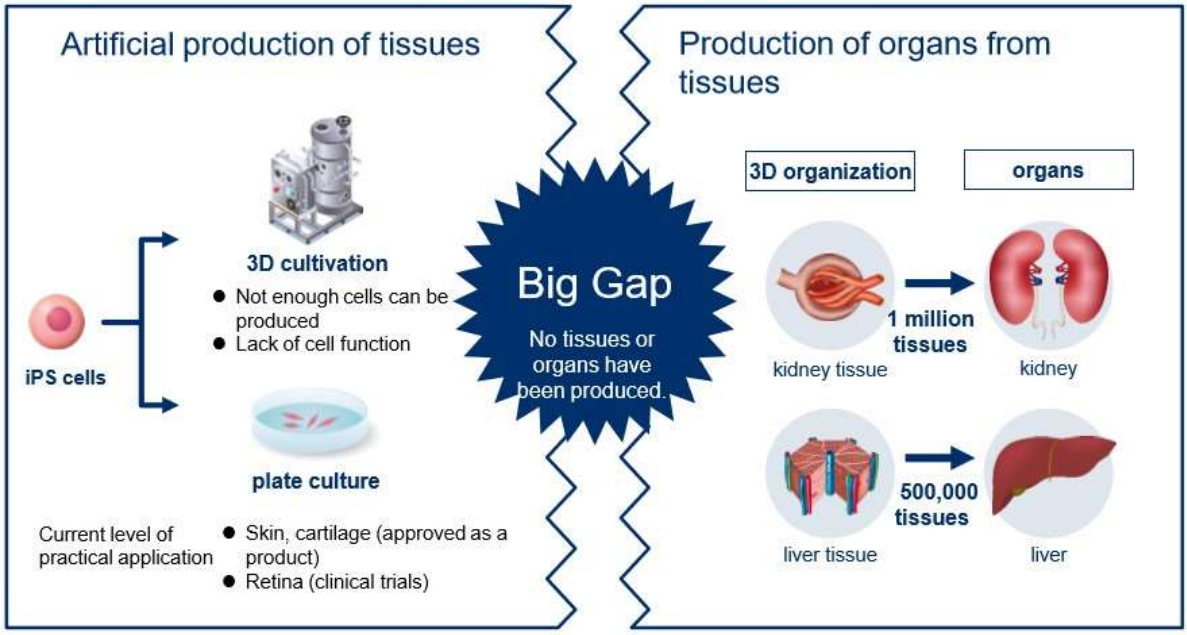
We will manufacture the organ in a timely manner in order that anyone can receive a transplant when they need it. It is not popular these days yet, but artificial meat tends to be a topic. But this technology is nothing compared with the artificial meat. Various challenges still lie in making stem cells into organs.

Current status of regenerative medicine using iPS cells

In terms of structure and function, a large gap exists between cultured tissues and biological tissues and organs.



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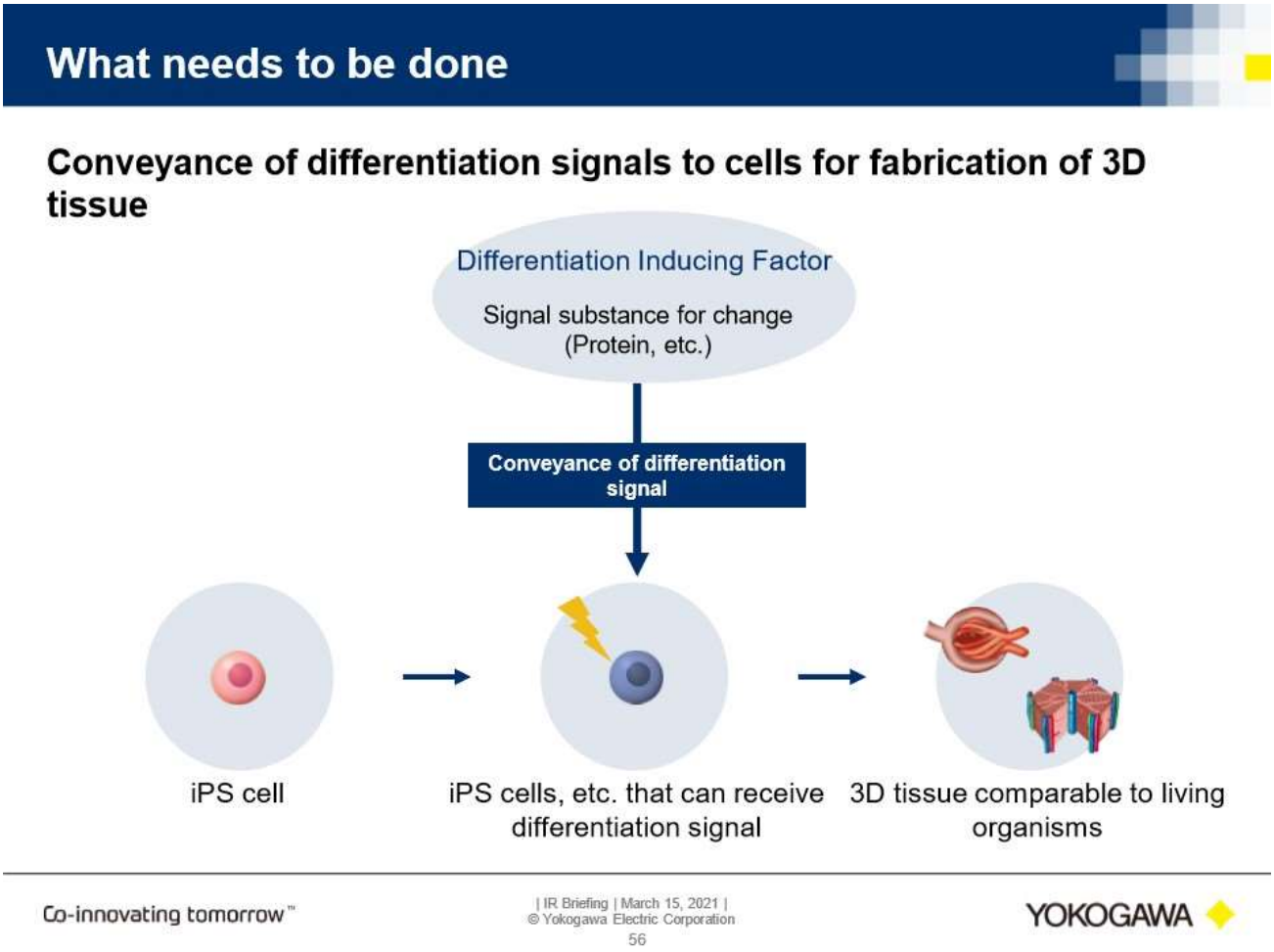
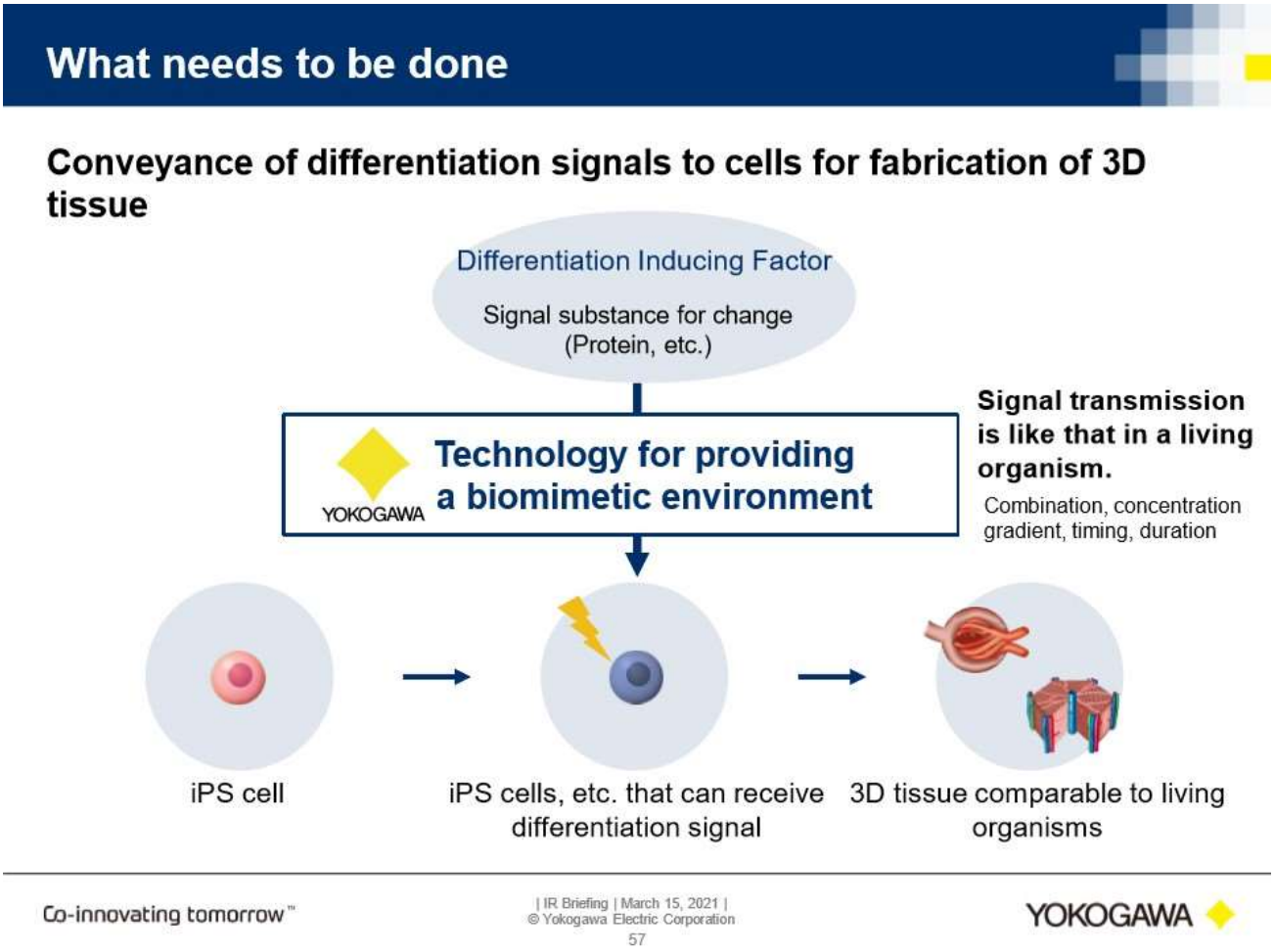
There is a big gap. The left side of the slide is a tissue that can be artificially created. There are now two methods for culturing stem cells such as ES cells, such as iPS: plate culture and three-dimensional cultivation.

On the other hand, there are many organs that can be created by living organisms, as shown on the right side, but no tissues or organs are created yet. That is because there is a big problem there.

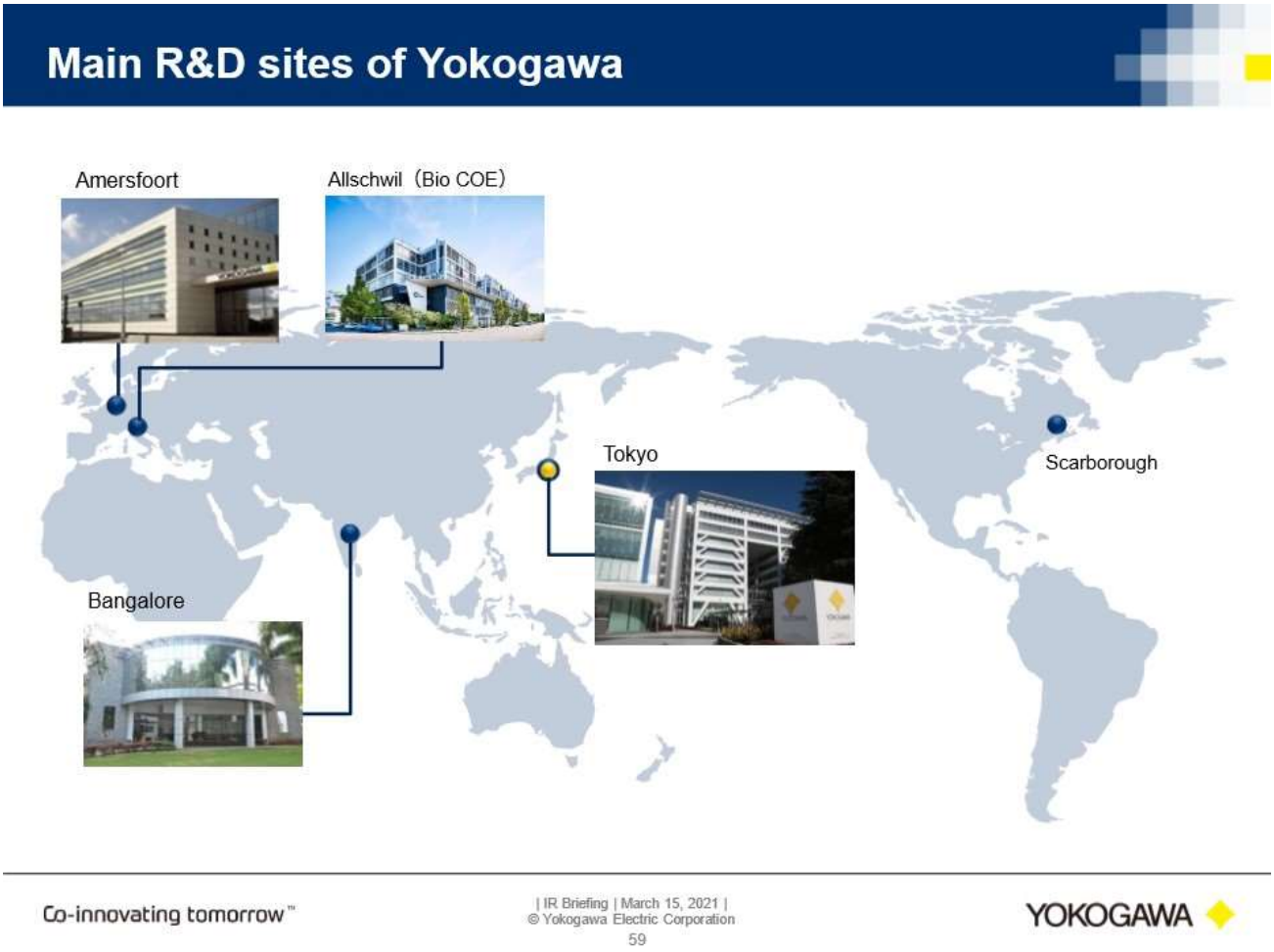


This is one of the issues. Differentiation signals must be given to iPS cells as appropriate. In other words, this differentiation-inducing factor is important in order to change iPS cells. By giving the differentiation-inducing factor at an exquisite timing, iPS cell will be transformed into a three-dimensional cell.



Currently, there is a big problem that these cells themselves are not measured very well. Therefore, there is a major premise that if not measured we cannot cure them or make 3D tissue. We will first try to provide an environment similar to that of a living body. In other words, we are currently doing R&D to transmit signals correctly like living organisms.

Lastly, I would like to talk about R&D strategy of Yokogawa: the fifth item on the agenda.

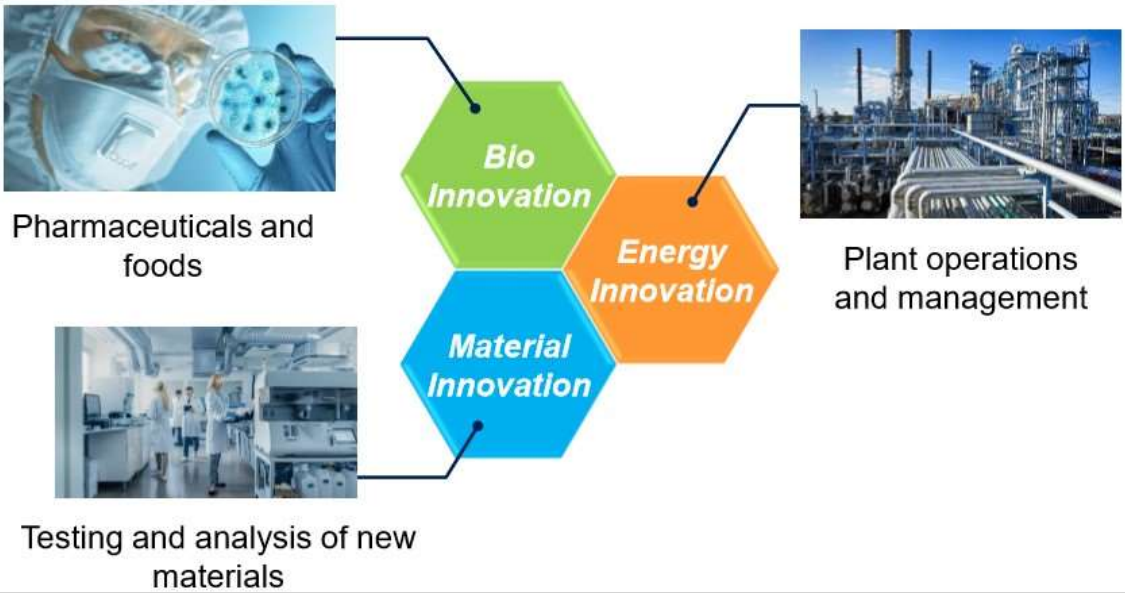


Yokogawa has several R&D centers around the world, first in Mitaka, Tokyo. The rest is in Amersfoort, the Netherlands, and Bangalore, India. And in Scarborough in the US.

Last year, Yokogawa launched the first COE, Center of Essence, for biotechnology in Basel, Switzerland. Several people have already been assigned and are currently conducting R&D activities in Basel, Switzerland.

What do we have in common?

"What techniques should be used to produce materials with what kind of functionality, and how should such materials be utilized?
→**Yokogawa develops and provides the right solutions to make this happen.**



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What do we have in common? In order to promote R&D activities while using R&D centers around the world, divided into the three categories, more than 40 projects are currently in progress.

The ultra-high-speed biocontamination solution introduced earlier, or the solution for bioregenerative medicine, is also included.

Three themes

Long-term business framework

Biology Universe Oceans

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As I mentioned earlier, there are three themes. The first is biology, but Yokogawa does not have an image of biology.

Three themes

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Therefore, the year before last, we placed an ad like this. We made a big advertisement in a newspaper and made a train ad space buyout on the Yamanote line.

We have put out hanging advertisements such as “Yokogawa Electric is thinking about iPS cells,” and “YOKOGAWA is now thinking about the inheritance of the earth.”

This was just a time of recruiting, so we put up such advertisement to recruit students from fields that have never existed before.

Three themes

What's next for our planet? Let's make it smarter.

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Right now, this is our marketing message. We will continue to disseminate our buzzwords, “What’s next for our planet? Let's make it smarter,” to all over the world.

We would like to continue to improve the global environment and take on the challenge of SDGs in the biology with people and partners who want to talk about our planet in the future.

I have talked about next three to five years.

Next, Mr. Nakao of the Life Innovation Business Headquarters will talk about the next three years.

Thank you for your attention.

Nakao: Hello everyone. I am Nakao from the Life Innovation Business Headquarters. Today, as Mr. Nakatani mentioned, I would like to talk about the updates and progress of the activities of the life innovation business, which I explained at the Sustainability Meeting held in December 2019, as well as initiatives in areas such as biotechnology and cell regenerative medicine.

As for agenda, today I would like to talk about these two.

First, I would like to introduce the future trends of life innovation business and the progress of our business.

Self-introduction

Vice President
Head of Life Innovation Business Headquarters
Hiroshi Nakao

Apr. 1989	Joined the Company
Apr. 2004	Solution Business Headquarters, Solution Sales Division 2, Head of Sales Department（Area : China・Korea・Taiwan）
Feb. 2004	Yokogawa (Shanghai) Instrumentation Co., Ltd. Head of Sales Department
Jan. 2006	Yokogawa (China) Co., Ltd. Head of Sales Department 1
Jan. 2007	Solution Business Division, Sales Division 3, Head of Account Sales Department 2
Apr. 2016	Yokogawa Solution Service corporation KANSAI Area Headquarters, Head of KANSAI Sales Department 1
Apr. 2019	Vice President Head of Life Innovation Business Headquarters (present)

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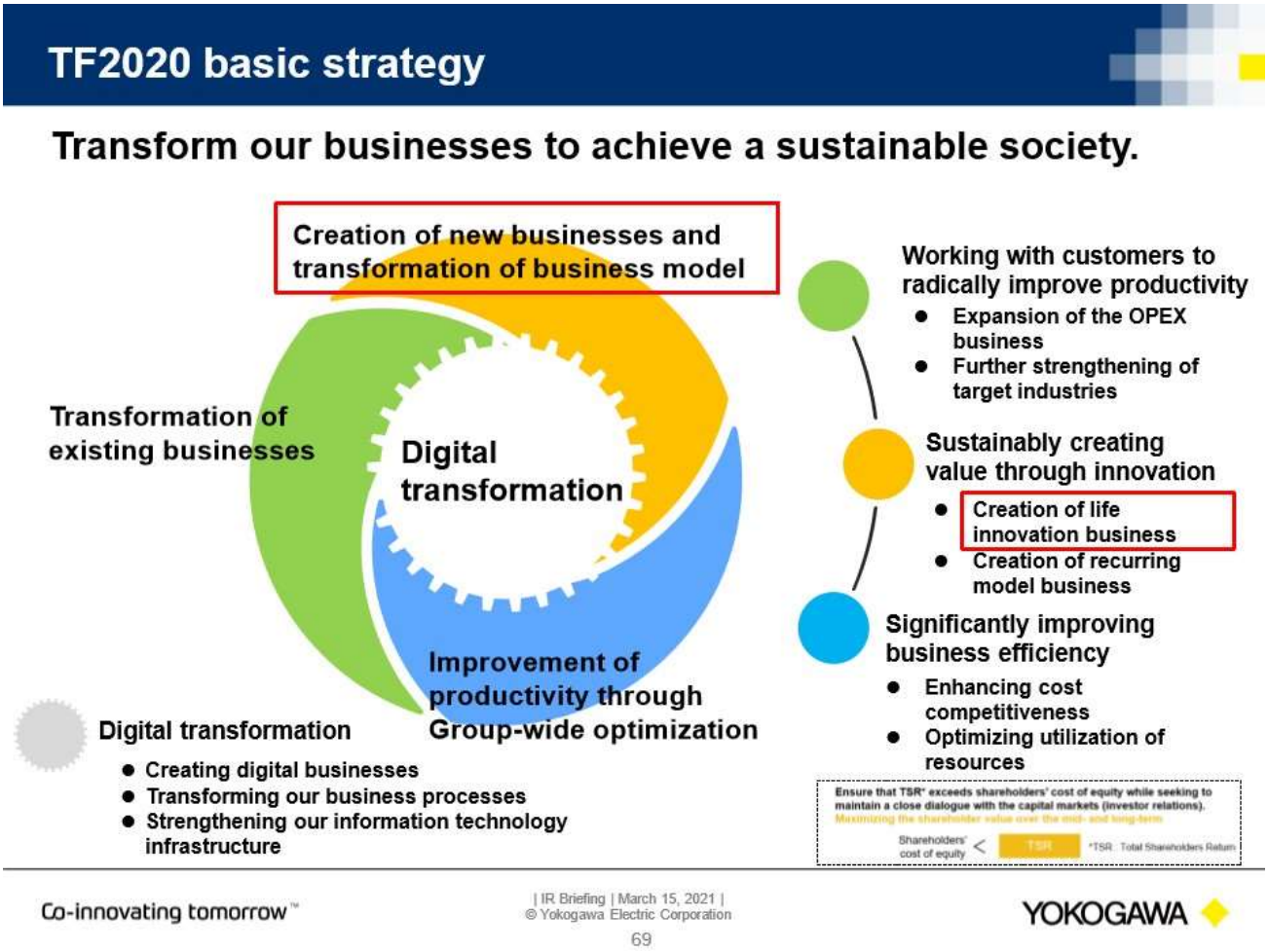
First of all, I would like to introduce myself.

I joined Yokogawa Electric in 1989 and have been an engineer in charge of customers in the pulp and paper field. Since 2004, I have been in charge of China, South Korea, and Taiwan, and after that, I was assigned to China and stationed in Shanghai and Beijing, mainly in charge of customers in the petroleum and petrochemical field.

After returning to Japan in 2007, I was in charge of customers in the food and pharmaceutical field, and from 2016 I was assigned to Kansai, where I was in charge of customers in the petroleum, petrochemical, and chemical field and food and pharmaceutical field.

I have been in charge of the Life Innovation Business Headquarters since April 2019.

First is the future trends.



The Life Innovation Business Headquarters, which I am in charge of, is positioned as a new business in the basic strategy of the mid-term business plan TF2020 and a challenge to creation of new business and transformation of business model and was established in April 2018. The first Head the Life Innovation Business Headquarters was Mr. Nara, the current President and CEO.

Creating sustainable value through innovation

Creation of life innovation business (2018-2020)

Focusing on the pharmaceutical and food industries, establish a support business that improves safety and enriches lives.

Environmental changes and issues

- The business environment has changed significantly due to issues such as population growth in developing countries and population aging in developed countries.
- The need to address a variety of global social issues is leading to the development of bio technology solutions using genome and digital technologies and a change in general attitudes on health, food, and medicine.

Population & food issues | Population aging | Developing genome technology | Drug development process (especially bio medicine) | Mass production tech

Increasing medical bills | Utilizing bio technology | **Pharmaceutical and food industries** | Safety management tech | Logistics management tech

Need for safety | Digital technology innovation | Health consciousness | Quality assurance/management tech | Reduction of food waste

Aim

- Through the use of measurement, control, and information technology, radically improve productivity across the entire value chain, from basic research to logistics and services.

Strategy

- Expand business based on existing pharmaceutical/food industry businesses and new technologies and products that are under development.
- Expand solutions portfolio by actively utilizing external resources and M&A.

Target

Through new businesses, increase orders* **2 to 3 times** by FY20 (compared to FY17)

*Sales for pharmaceutical and food industries *FY17 result: approx. 12 billion yen

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70

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Here are the details for establishing the life innovation business. Sorry for the slightly busy slides.

Our mission is the establishment of a support business that improves safety and enriches lives, focusing on the pharmaceutical and food industries, and we aim to realize a radical productivity improvement through the entire value chain from basic research to logistics and services through the use of measurement, control, and information technology.

What we need to have in 2030

Life Innovation Business Vision

We will lead the world
in advancing "Bio Industrial Autonomy(BIA)", and
contribute to a future embracing global harmony.

Business Domain
Pharmaceutical, Food, Beverage & Biotech

Our Strengths
"Measurement, Imaging, Analysis, Diagnosis, Integration"

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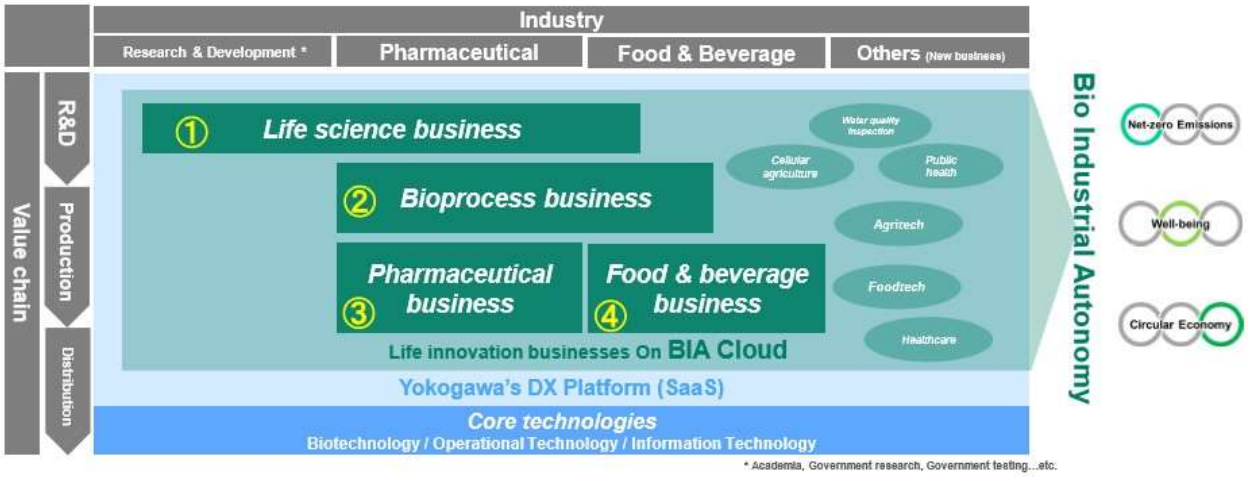
We thought about our vision, what we need to have in 2030.

"We will lead the world in advancing Bio Industrial Autonomy, BIA, and contribute to a future embracing global harmony." With this vision, we are aiming to expand our business mainly in the fields of pharmaceutical, food, beverage and biotechnology by making the best use of Yokogawa's strengths of "measuring, seeing, and connecting".

Four business segments aiming to realize BIA

- Establish a unique and absolute position in the market by deepening and strengthening core technologies of "Measurement" and "Imaging", and by exploring and acquiring new technologies
- Fully use the technologies that " Integrate" organisms, assets, and information, become a reformer "Industrial Automation" to "Industrial Autonomy"



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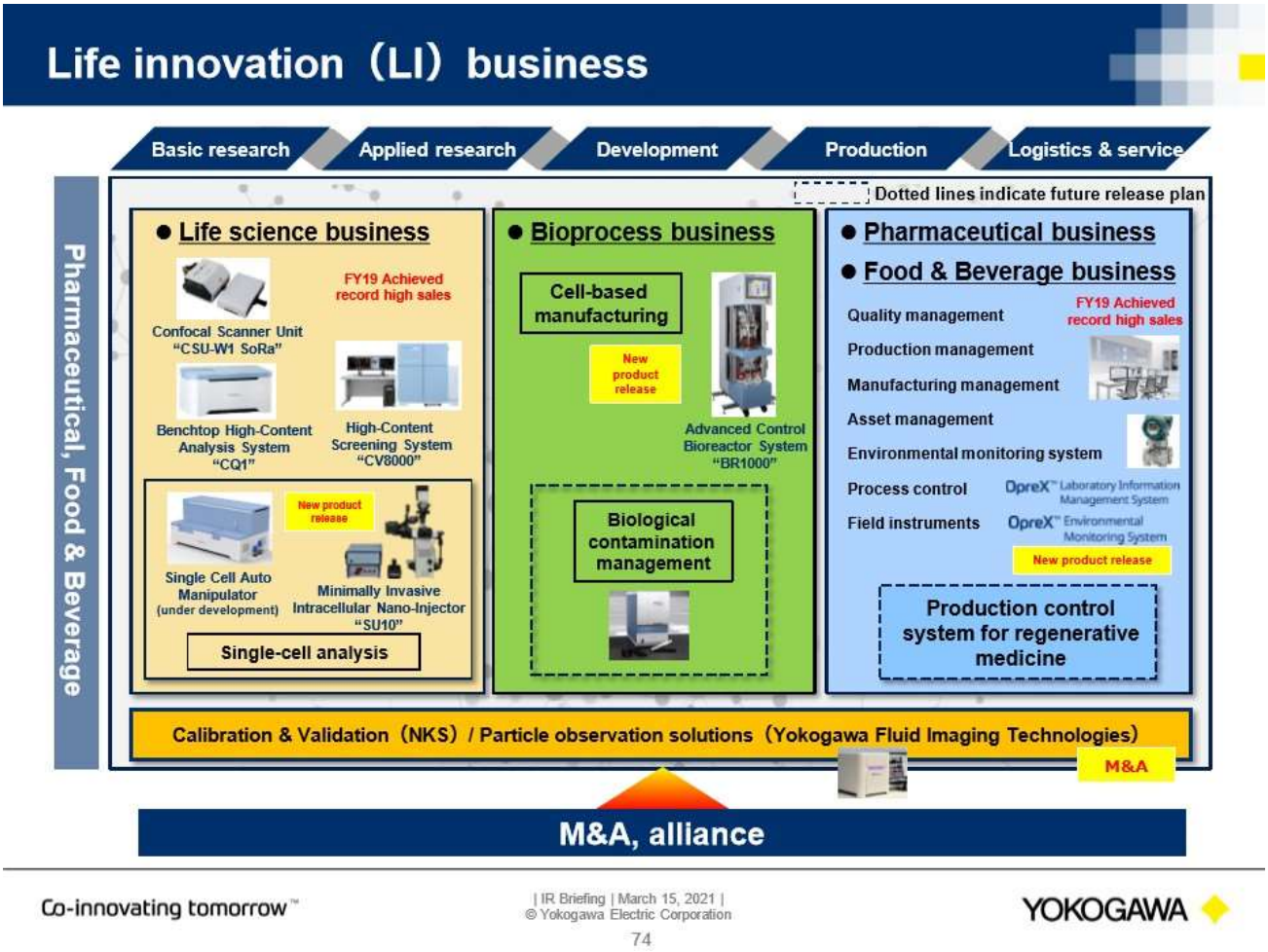
We have set four business segments aiming to realize Bio Industrial Autonomy: Life Science Business, Bioprocess Business, Pharmaceutical Business, and Food and Beverage Business. In order to explore new businesses, we are currently developing activities that take into account those as well.

Toward 2030, we will establish a unique and absolute position in the market by deepening and strengthening the core technologies of measuring and seeing and exploring and acquiring new technologies. Make full use of the ability to connect people, goods, and information, we want to transform Automation to Autonomy.



Now, I would like to introduce the progress of the business.

First of all, I will explain the scope of the four businesses. The yellow part on the left is Life Science Business. The light blue part on the right side corresponds to the provision of solutions to the production areas of Pharmaceutical Business and Food and Beverage Business, which I mentioned earlier. In the middle, this is the Bioprocess Business, where we are developing new products.

We are engaged in this Life Innovation Business while continuing activities, such as M&A and alliances, as a search for new businesses, in addition to those four businesses.

By the way, as described in the orange area, we acquired NKS, which provides added value in the validation and calibration work in lifetime, and Yokogawa Fluid Imaging Technologies, a US company of particle observation solutions, in December 2018 and in April 2020, respectively.

We are still considering such strategic alliances and M&As and aiming to expand our business.

Thanks to you, we were able to achieve record high sales in the areas of Life Science Business, Pharmaceutical, and food &Beverage in FY2019.

In addition, we were able to release new products such as single-cell analysis and cell-based manufacturing, which we have been active on as new businesses, such as SU10 and BR1000. In these new businesses, we would like to aim for profits that exceed this while being aware of the cost of capital.

- Life science business
- Bioprocess business
- Pharmaceutical business
- Food & Beverage business
- Development of new businesses

Now, I would like to introduce these five fields.

- **Life science business**
- Bioprocess business
- Pharmaceutical business
- Food & Beverage business
- Development of new businesses

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76

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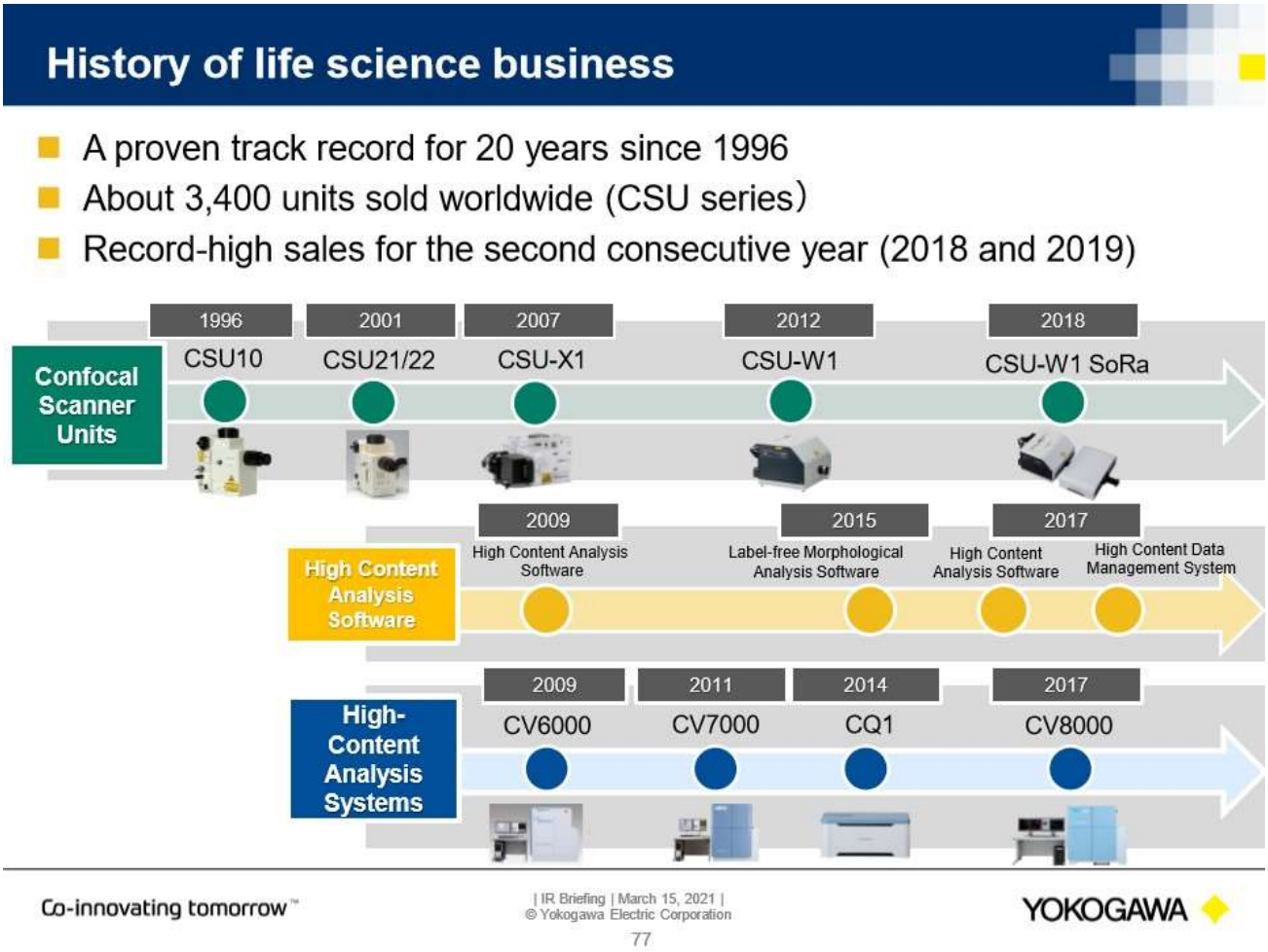
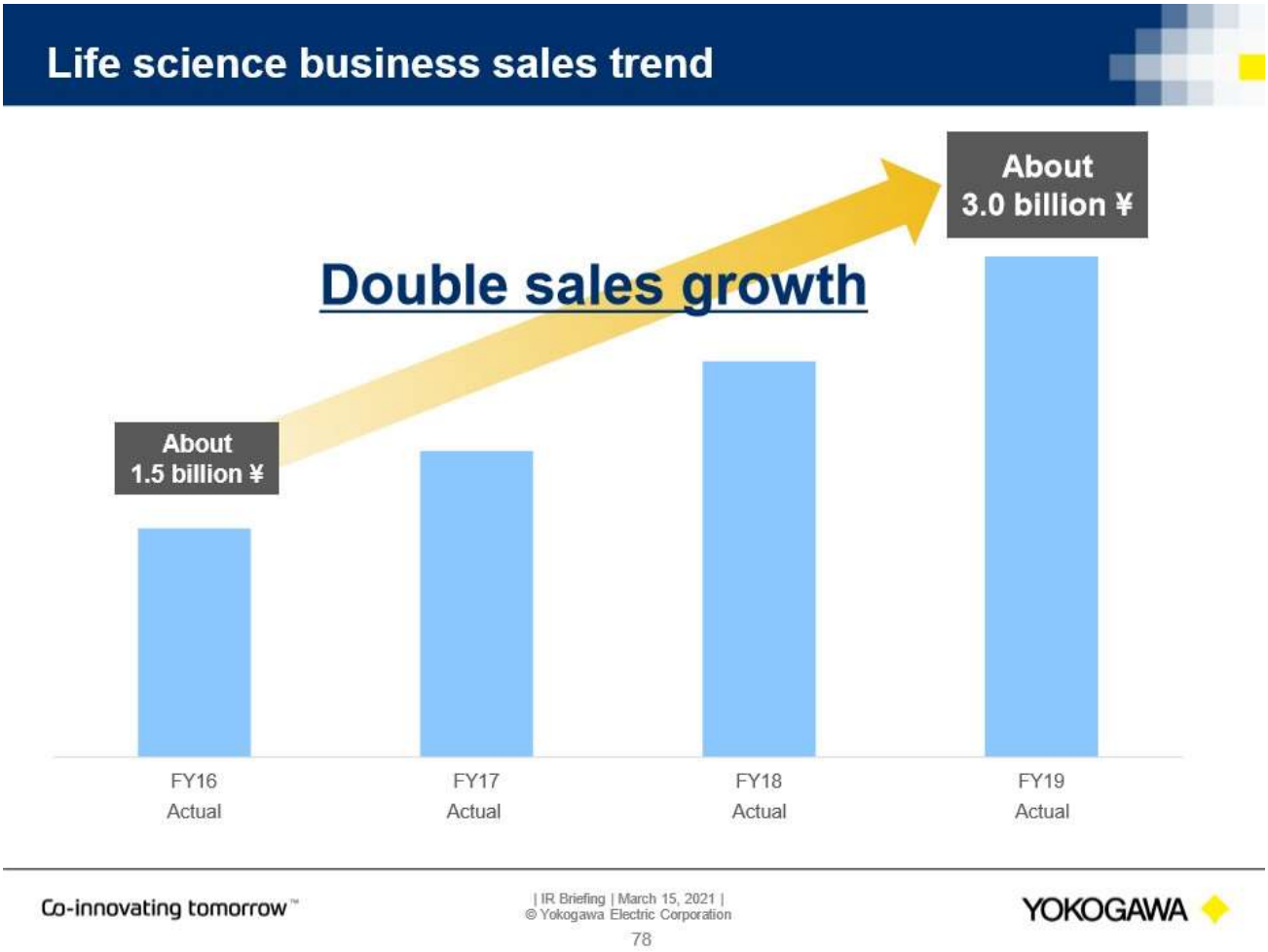
First is the Life science business.



This includes a confocal scanner unit, high content analysis, and single-cell analysis.

First, Yokogawa launched the confocal scanner unit CSU series in 1996. It has a history of more than 20 years. Currently, this confocal scanner unit has sold 3,400 units worldwide. Unlike ordinary optical microscopes, this technology enables 3D observation of living cells. It is used not only in basic research fields but also in applied research and drug discovery processes in academic societies, universities, and pharmaceutical companies.

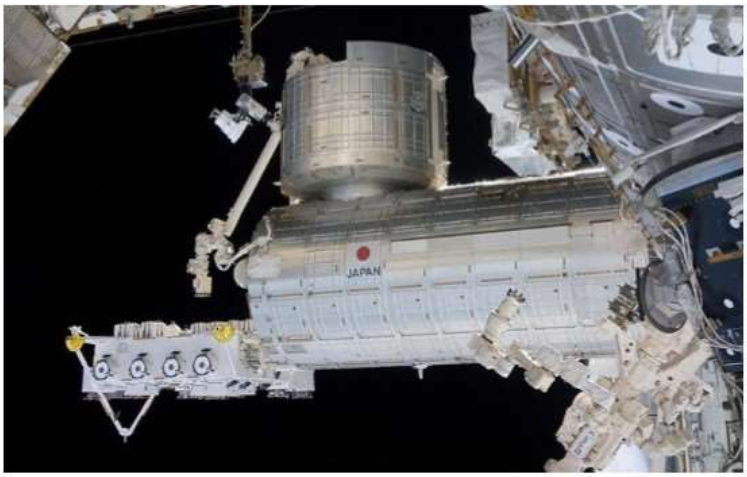


The scale of the Life Science Business is still small, with JPY1.5 billion in FY2016, but it has reached JPY3 billion in FY2019, doubled in three years.

Life science business

Confocal Scanner Unit "CSU-W1" arrives at international space station (ISS)

COSMIC confocal microscope system ©JAXA



"KIBO," the ISS's Japanese Experiment Module ©JAXA/NASA

Confocal Scanner Unit "CSU-W1"

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As a topic, our confocal scanner unit, CSU series, is equipped with the microscope system, COSMIC. You see the photo on the left. This is also used in the Japan's first manned experimental facility on the International Space Station, "KIBO."

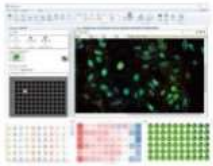
The topic is that Yokogawa is slightly contributing to life science experiments in outer space.

Life science business
Support activities for COVID-19 researcher

- College of Pharmacy, University of Michigan (US)
- School of Cellular and Molecular Medicine, University of Bristol (UK)
- Faculty of Biological and Environmental Sciences, University of Helsinki (Finland)
- Institute of Pathology, Charité – Universitätsmedizin Berlin (Germany)
- Institute of Microbiology, Chinese Academy of Sciences (China)

Bench-top High-Content Analysis System "CQ1"

High-Content Screening System "CV8000"



High-Content Analysis Software "CellPathfinder"

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Next, Yokogawa's high-content analysis, CellVoyager series, is used by academia and pharmaceutical companies around the world.

Yokogawa products are used in large numbers for research support and vaccine development experiments for COVID-19, which is currently rampant. The institutions displayed here are examples of major uses. In addition to this, it is also used by many global pharmaceutical companies.

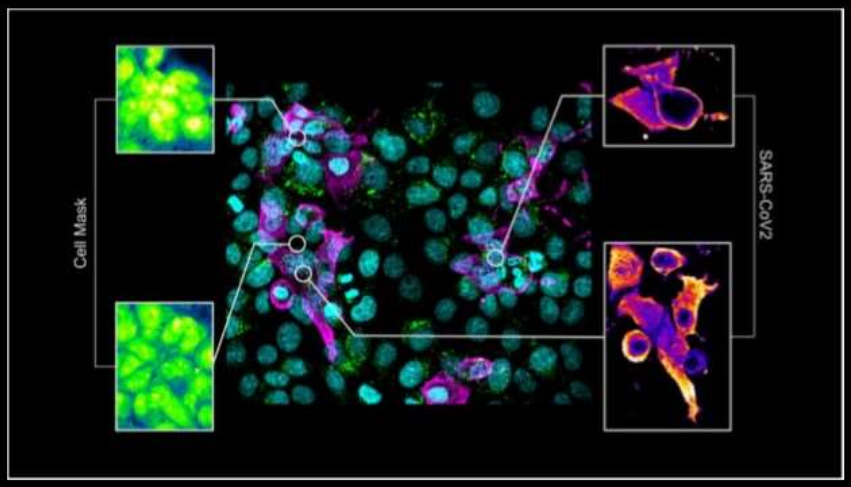
Life science business
Support activities for COVID-19 researcher

- **University of Michigan (US)**

Discovering Potential Covid-19 Therapies using High Content Screening

Dr. Jonathan Sexton, Ph.D.

Assistant Professor of Internal Medicine, Division of Gastroenterology and Hepatology
Assistant Professor, College of Pharmacy, Medical Chemistry
Faculty Lead, Michigan Institute for Clinical & Health Research, MICHR, Drug Repurposing



Morphological profiling of SARS-CoV-2 infected Huh-7 cells (MOI of 0.2 for 48 hrs). Center image: representative field with nuclei (cyan), neutral lipids (green), and SARS-CoV-2 NP protein (magenta).

Mirabelli, C. et al. (2020). Morphological Cell Profiling of SARS-CoV-2 Infection Identifies Drug Repurposing Candidates for COVID-19. *bioRxiv*, preprint. doi: https://doi.org/10.1101/2020.05.27.117184

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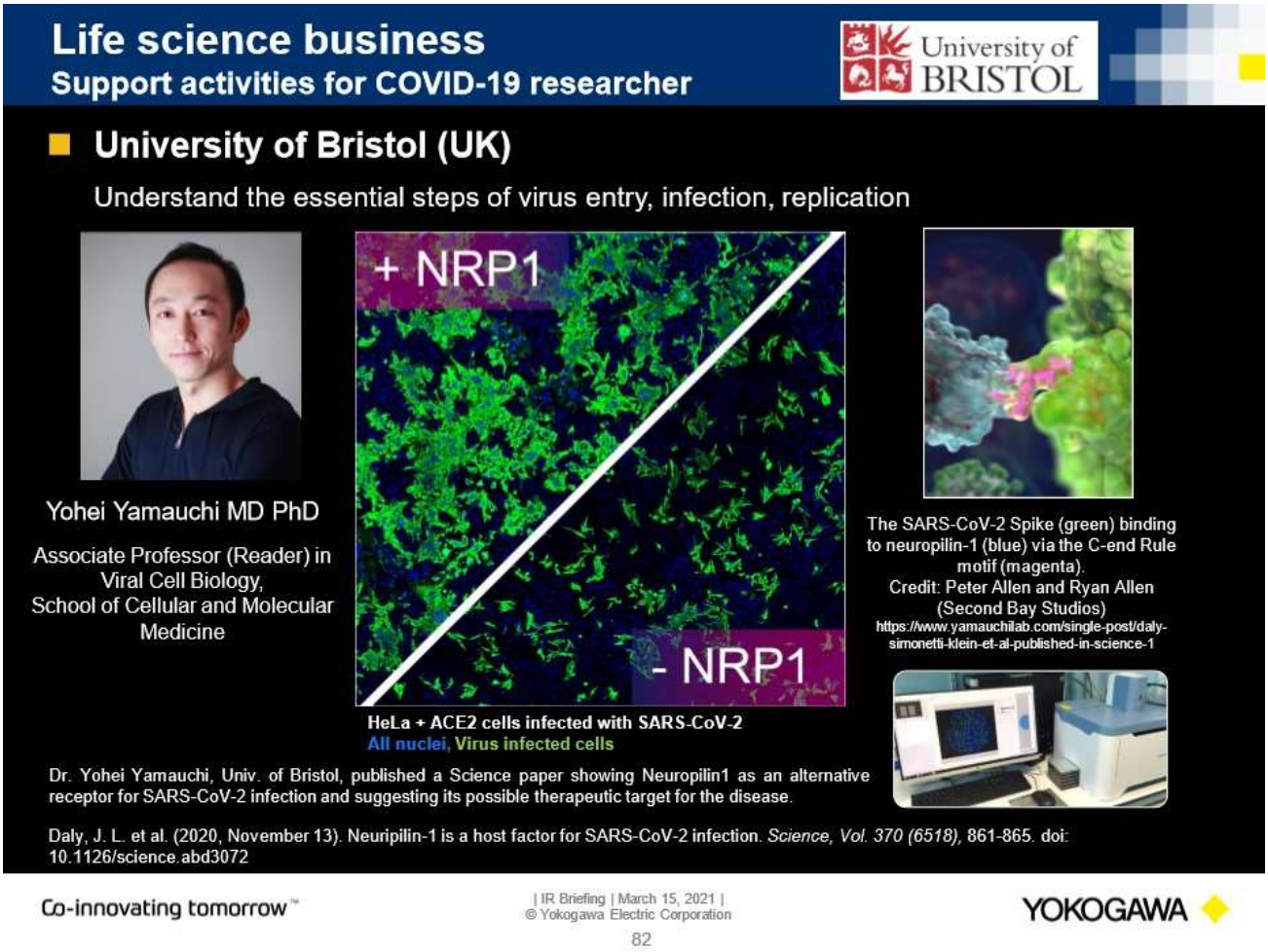
I would like to introduce some examples.

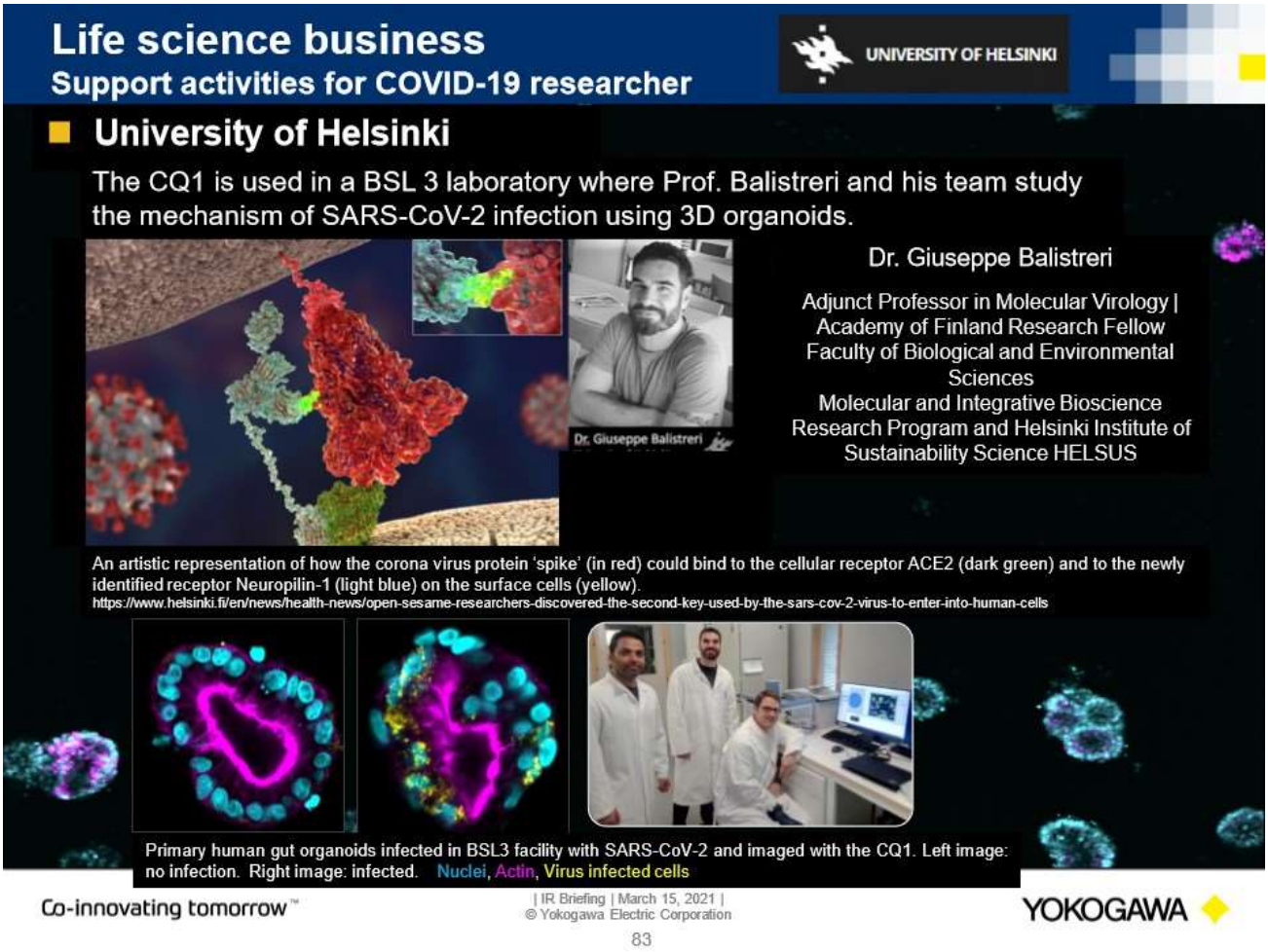
First is the University of Michigan in the United States.

Here, for the early development of treatment methods, they are screening COVID-19 therapeutic agents using existing drugs, and we heard that it is being used for morphological profiling of virus-infected cells.



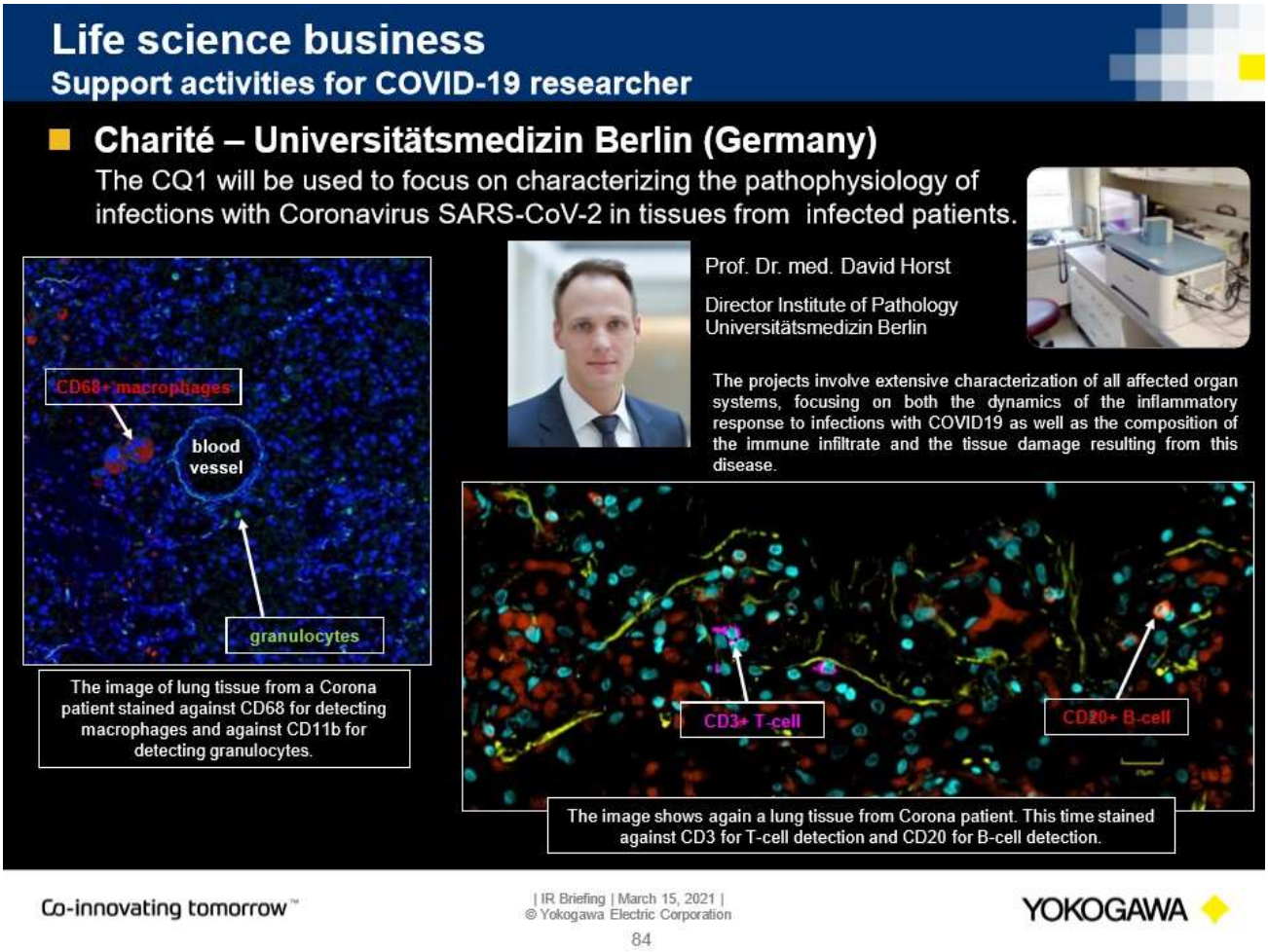
Next, here is an example from the University of Bristol in the United Kingdom.

It is used here to elucidate the mechanism of important steps such as virus invasion into cells, infection, and replication.



Next, here is a story at the University of Helsinki, Finland.

Here, we heard that organoids are used in experiments to analyze the infection mechanism of SARS-CoV-2 (SARS coronavirus 2) in three dimensions.



Finally, this is an example from the University of Charite in Germany.

We heard that using pathological tissues derived from patients infected with SARS-CoV-2 (SARS coronavirus 2), they study the pathophysiological characteristics of various organs infected with the virus.

These are the ones that have been approved for publication. In addition to these, Yokogawa's high-content analysis series, CellVoyager, is being used by many university researchs institutes in Japan and overseas.

Yokogawa's single-cell analysis

- To prevent cancers and other diseases before they occur by elucidating the causes of occurrence and progression, and to produce effective treatments, single-cell analysis research is receiving increasing attention.

	Minimally Invasive Intracellular Nano-Injector "SU10"	Single Cell Auto Manipulator (under development)
Product image		
Pipette size	**Nano-meter** (nm) 1nm : One-billionth of a meter	**Micro-meter** (μm) 1μm : One millionth of a meter
Automation content	Cell surface detection and penetration	Aspiration of cells at the specified positions
Aspects	Injection of foreign substances such as genes and drugs	Isolation of single cell or aspiration of intracellular components
Applications	Drug efficacy and toxicity assessment of drug candidate molecules/ Genome editing	Drug discovery research and elucidation of life phenomena

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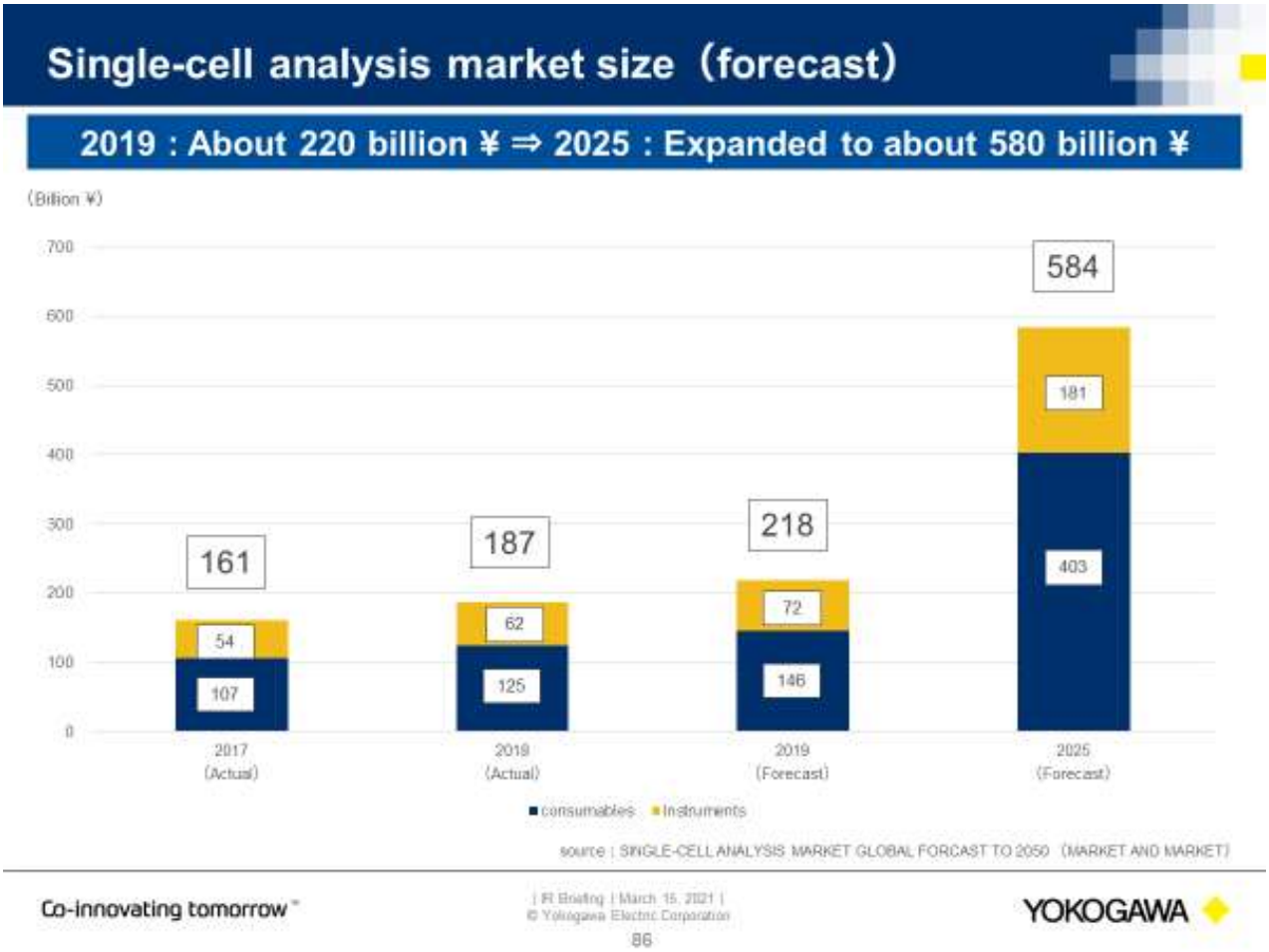
Next, I would like to introduce the single-cell analysis.

Currently, there is increasing interest in research on the single-cell in order to prevent the onset of diseases such as cancer by investigating the cause of the onset and progression, or to create effective therapeutic agents and treatment methods for them.

Therefore, we have released and are developing two types of products.

On the left side, the product name is SU10, a minimally invasive intracellular. The other is on the right side, which is a single-cell auto manipulator currently under development.

A big difference is the size of the pipette. That of the SU10 on the left side is nano, and of the auto manipulator on the right side is the micro size.



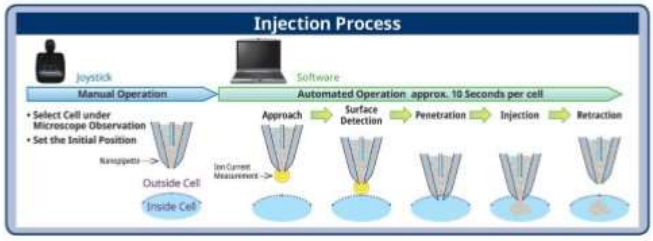
The market of the single-cell analysis is expected to expand from about JPY220 billion in 2019 to about JPY580 billion in 2025.

The market that Yokogawa is aiming for is about 10% of the orange part of JPY181 billion.

Minimally Invasive Intracellular Nano-Injector "SU10"

Released in Japan in March 2020, and in North America, China, and Europe in February 2021

Low invasiveness	Glass pipette with tip size of under 100 nm
Automated penetration	Automated cell surface detection and penetration (Z direction movement)
Automated injection	Automated, controller volume injection using electro-osmotic flow
High success rate	Approx. 95% (※) success rate of injection ※ Based on a Yokogawa survey
Single-cell targeting	Enabled injection of selected cells under microscope observation
Rapid injection	Capable of injecting one cell every 10 seconds



Minimally Invasive Intracellular Nano-Injector "SU10"

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This SU10, the minimally invasive intracellular, was launched in Japan in March of last year and in North America, China, and Europe in February of this year for research fields.

For this product, a glass pipette with tip size of under 100 nanometers, called nano-pipette, is adopted and genes and drugs can be automatically directly injected into one cell, or individual intracellular substance can be collected alive.

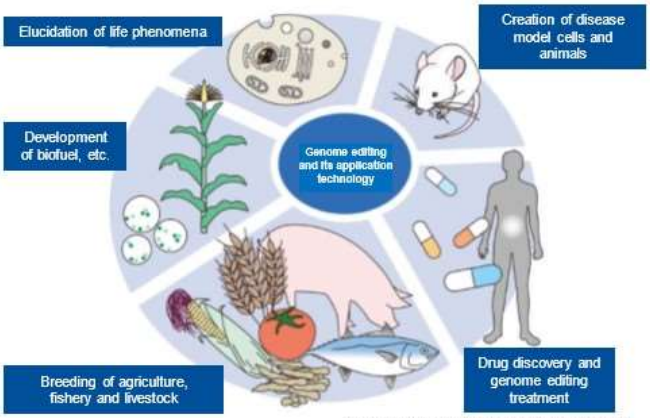
2020 Nobel prize in Chemistry "genome editing（CRISPR-Cas9）"

Genome editing

Biotechnology method that lets specialists change the DNA of organisms by cutting the DNA at a specific spot, then remove, add, or replace the DNA

CRISPR-Cas9

CRISPR-Cas9 is a simpler, easier, faster, more efficient and more precise genome editing system than traditional methods



Source : Genome Editing Experiment Standard

Applications of genome editing

efficiency	• [Past]The success rate was once every 1 million to 10000 times [Now] Successful nine times every 10 times • [Past]The time of half a year to one year was required [Now] shortened to three weeks
target coverage	• [Past] Restricted to certain animals and plants [Now] Effective for almost all animals and plants.
easy-to-use	• [Past] Several years of research and training were needed [Now] Can be used even by high school students if they are trained

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Regarding this SU10 technology, we hope that it can be applied to the experiment of genome editing, CRISPR-Cas9, which won the Nobel Prize in Chemistry announced last year.

Currently, we are discussing with Tokyo University of Science, etc.. It is reported that the success rate, which was 30% to 40% in the past, has reached a high success rate of 70% to 80% when using this SU10.

As you know, genome editing has great potential because it is applied to various fields such as elucidation of life phenomena, drug discovery, cell medicine, gene therapy, energy, agriculture, forestry, and fisheries.

Method of gene introduction

Introduction method	Method	
Physical	Injection Method of directly introducing into the cell operating under a microscope	Nano-injection Method of directly injecting into a particular cell using a glass needle with tip size of about tens of nm in diameter  Micro-injection Method of directly injecting into a particular cell using a glass needle with tip size of about μm in diameter
	Electroporation Method of introducing through pores on the cell surface created by applying pulsed electrical fields directly to the cell	
Chemical	Transfection Method of enhancing cellular uptake by mixing special reagents with the desired material	
Biological	Viral vector Method of introducing viruses into cells using the cell entry mechanism of virus	

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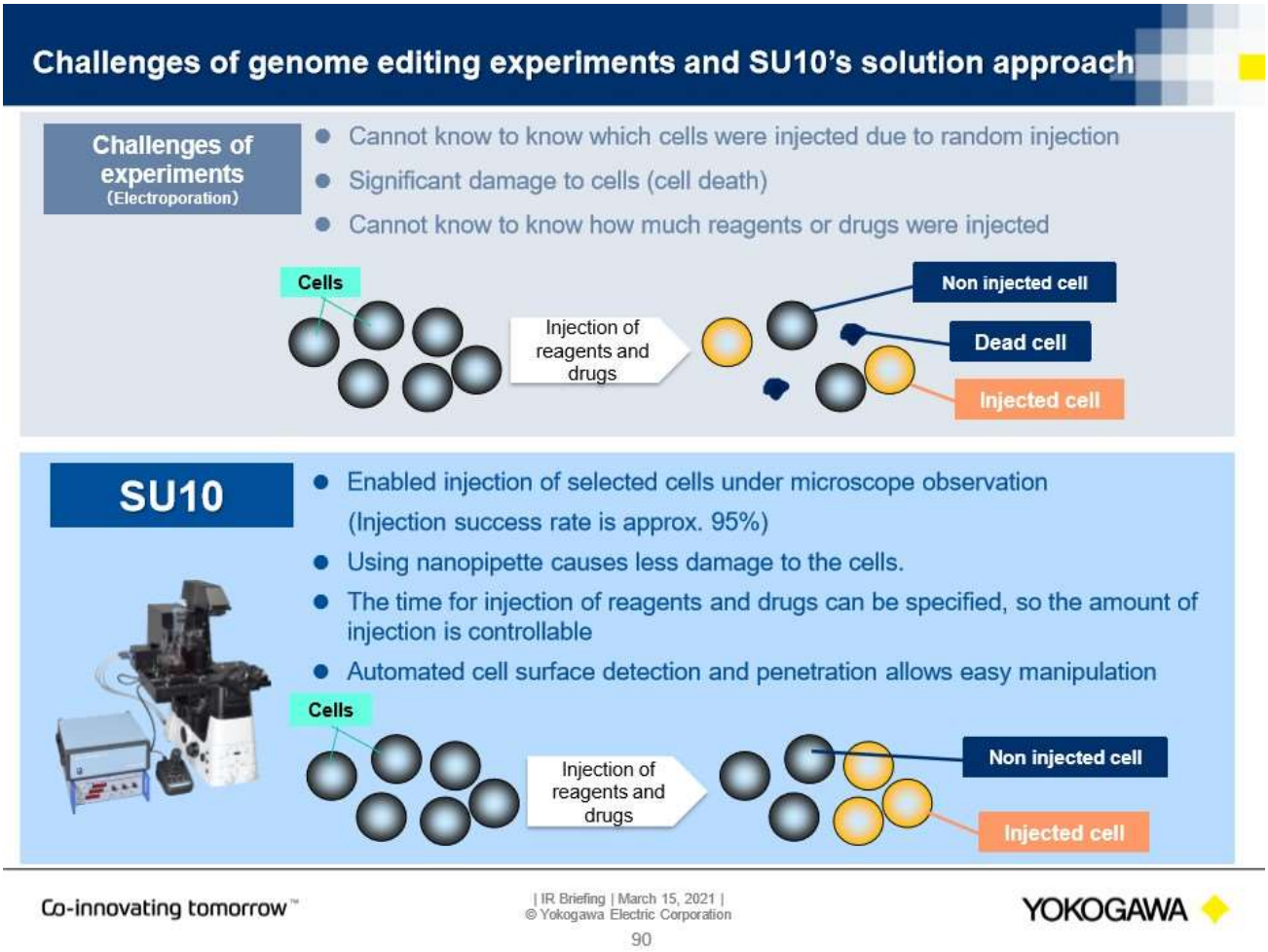
In genome editing, genes are cleaved by injecting reagents or drugs into the genes. The method is roughly divided into three categories: physical, chemical, and biological. Yokogawa's product is classified into the physical introduction method.

The method is the type of injection, and this time it is nano-injection.



From this page, I would like to talk about the comparison with the electroporation.

This is the comparison. As for the electroporation currently used in general-purpose technology, this experiment uses a method of making a hole in the cell membrane with electrical stimulation and injecting a reagent or drug, but the injection is random, and you do not know which cell it was injected into. And we heard that there is a problem that the damage to the cells is large and you do not know how much you injected.

On the other hand, with this SU10, it is possible to inject into specific cells or targeted cells, the damage to the cells is very small, and in some cases the success rate is 95%. We have realized the detection of the cell surface and automated puncture, so I think that anyone can easily operate it.

Minimally Invasive Intracellular Nano-Injector "SU10" moving image

URL : https://www.yokogawa.com/solutions/products-platforms/life-science/single-cellome/su10/

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91

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We made an image video of SU10, so please have a look.

The size of the pipette of this device is nano, so there is little damage to cells and a wide range of substances can be automatically injected. The drug can be selectively injected into the target cells and nuclei, and a Yokogawa survey shows a high success rate of about 95%.

It is possible to inject into primary cultured cells and plant cells, which are difficult to edit the genome and introduce into cells, which I introduced earlier.

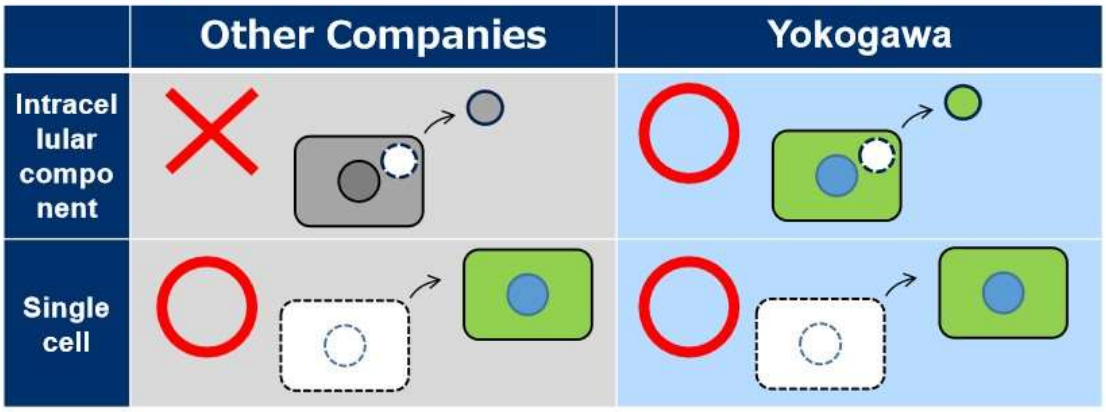
Single Cell Auto Manipulator

【under development】

Main features

- ✓ Supports living cells with built-in incubator
- ✓ Adopts vertical aspiration method
- ✓ Automated aspiration at the position specified on the image
- ✓ Automated selection of target cell, aspiration position setting, and automatic aspiration

Automated single sell "isolation" and "intracellular component" aspiration



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92

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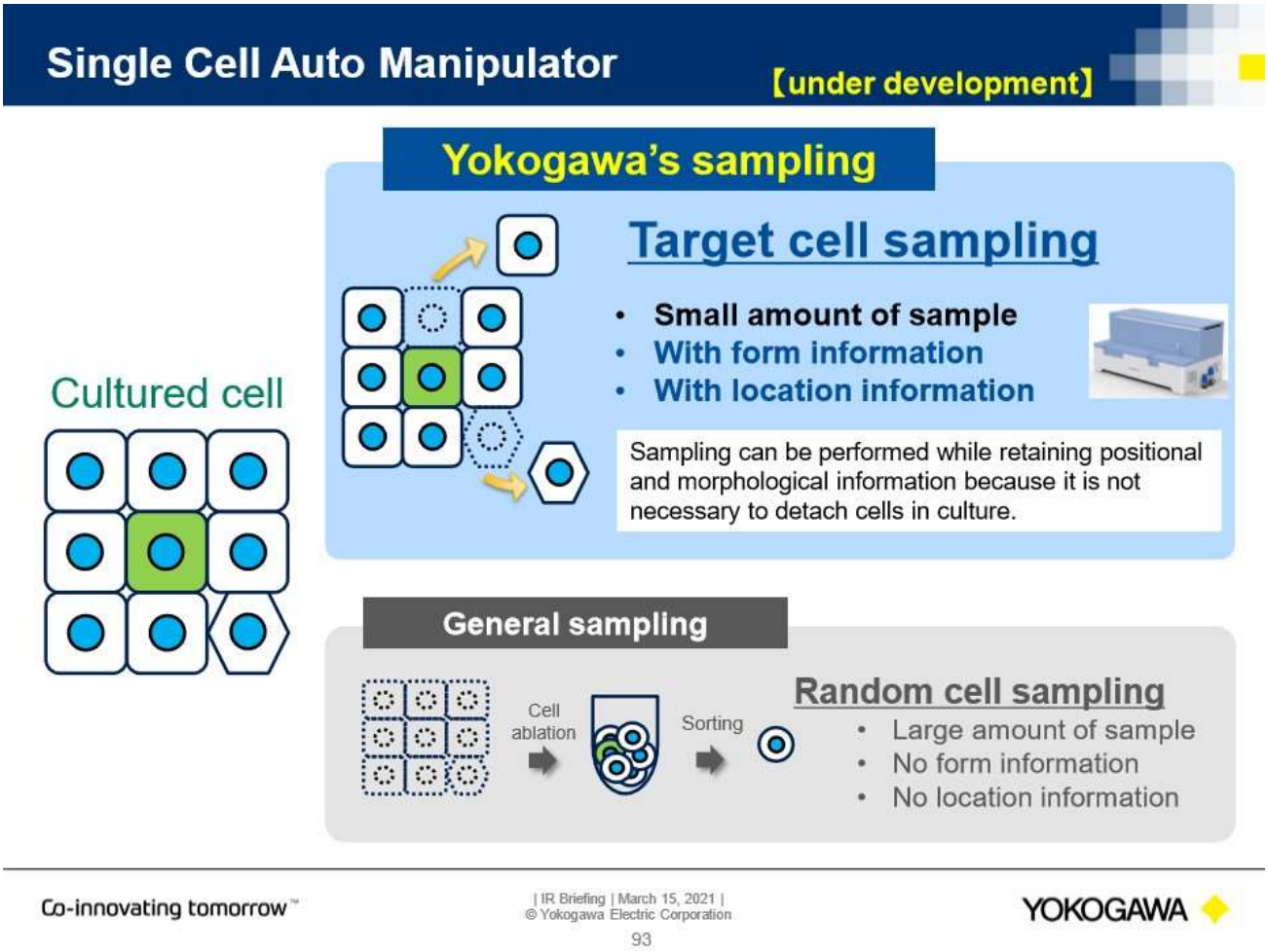
Next, this is the story of the micro size. I would like to introduce the single cell auto manipulator, which is under development.

So far, products of other companies also could isolate and peel off one cell, but Yokogawa's product is the only one that enables to automatically aspirate only the target site inside the cell.

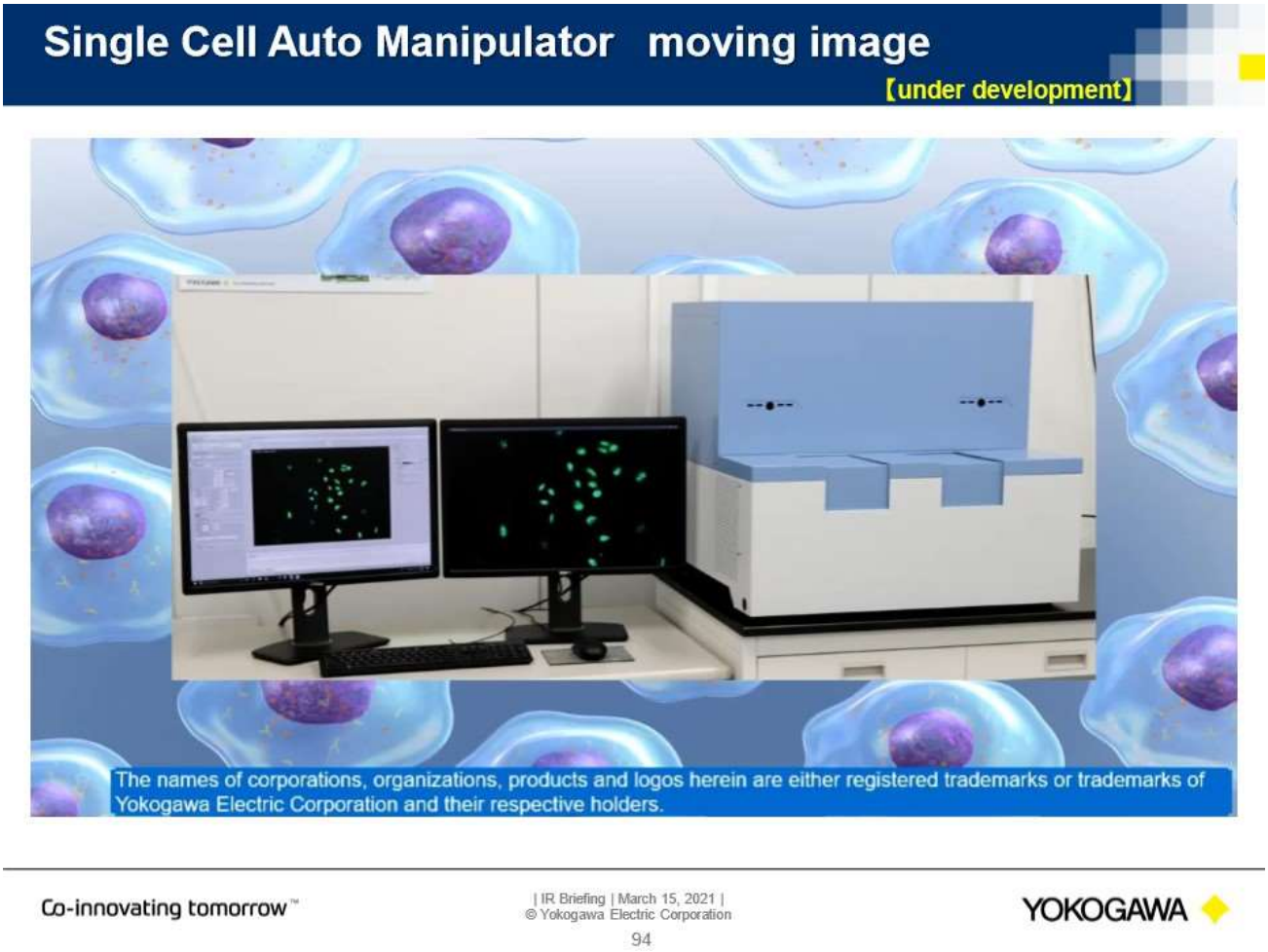


Also, in many existing devices, cells in culture are peeled off once by isolation of one cell, a suspension is made, and one cell is taken by sorting from it. We call this method random cell sampling.

While this method can collect a large number of samples at one time, but you cannot know where the cells were originally. It is a sampling method with which you do not know what kind of shape and position it was.

On the other hand, with the Yokogawa's product, it is possible to sample only specific cells during culture. We call this method target cell sampling.

This method does not require ablation of cells. Therefore, it is a product that enables sampling while retaining position information and form information.



Then, please watch the image video of this single-cell auto manipulator.

This product scans cells in culture and analyzes the image, for example, by conditions such as nucleus size.

It selects cells as targets from cells with the highest nuclear size. All you have to do is click the start button and sampling will start automatically. This product is a fully automatic system and sampling is possible while retaining position information and morphological information. The sampled cells can also be expelled into a container such as a PCR plate. It is also possible to pool multiple samples in the same well.

This is a sampling of intracellular components. Sampling of intracellular components can be performed by targeting the target organelle, for example, by fluorescently labeling it.

In addition, since it is scanned with a confocal microscope, it is possible to capture a three-dimensional high-definition image and precisely control the height of the suction position. Yokogawa's handler positioning technology is applied.

- Life science business
- **Bioprocess business**
- Pharmaceutical business
- Food & Beverage business
- Development of new businesses

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95

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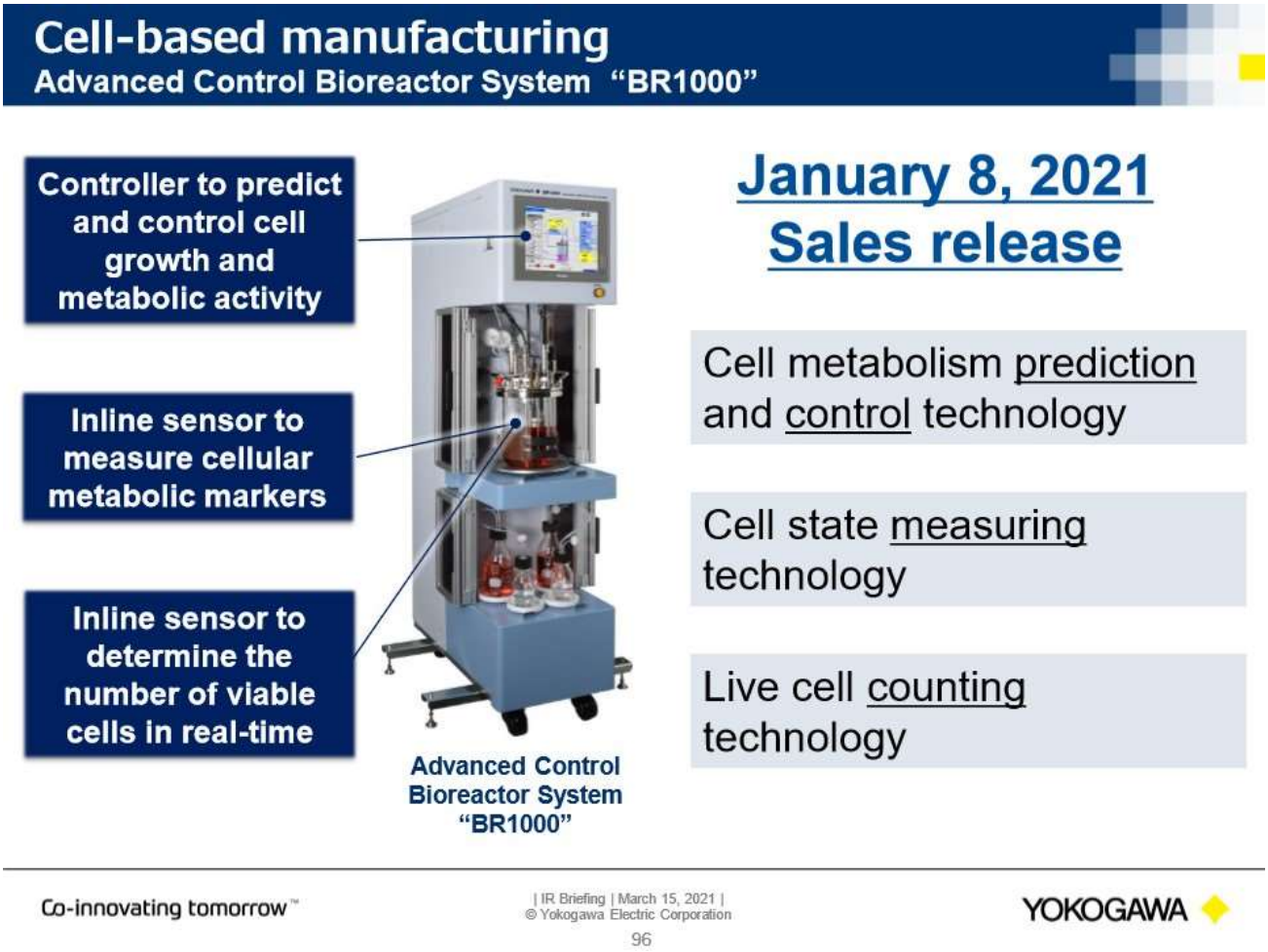
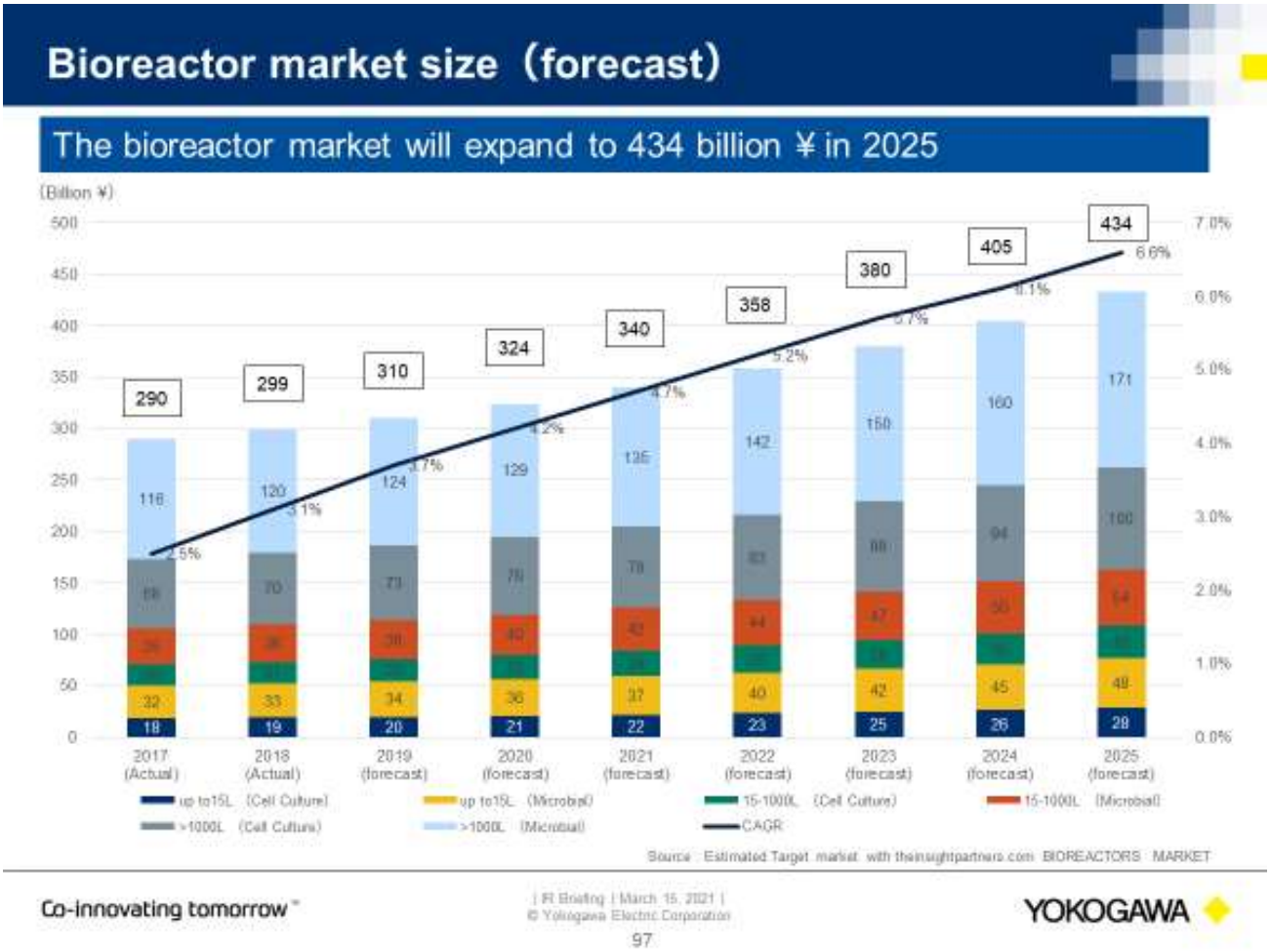
Next, I would like to introduce the bioprocess business.



First of all, I would like to introduce the cell-based manufacturing.

In order to contribute to the stabilization and efficiency of biopharmacy production toward the expansion of biopharmacy, we released the advanced control bioreactor system BR1000 in January of this year.

BR1000 is taking advantage of our strengths in measurement and control, Yokogawa's core technology. We aim to improve the efficiency of biopharmacy production by measuring glucose / lactic acid and the number of living cells in the culture medium with an in-line sensor and predicting and control cell culture based on the measured data.



This is the size of the bioreactor market.

The market is expected to expand to a scale of JPY433.5 billion in 2025, and the CAGR is also expected to expand year by year.

The target of the BR1000 is animal cell culture for the lab, the dark blue part at the bottom of this graph. In the future, we would like to expand the production scale and culture of microorganisms at the upper part of the graph.

Vision for the future

- **Contribution to biopharmaceutical production**
  - Continuous cultivation production method is highly expected in biopharmaceutical production
  - Contributing to increased productivity of bioantibody drugs with increasing demand
    - Development of advanced measurement and control units for production reactors
    - Development of technologies for improving production efficiency and ensuring quality
    - Expanding the scope of business for achieving continuous production

- **Expansion to bio-economy field**
  - In various industries, production of high-value added materials and substances by use of living organisms (microbes or cells) has been expected.
  - We aim to contribute to the further development of industry by applying these Biopharmaceutical technologies to bio-economy field.

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98

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In recent years, biopharmacy production is expected to be a production method in which continuous culture is performed.

Currently, we sell the laboratory level reactor. But in the future, we will develop advanced measurement and control units for production reactors, promote technological development for improving production efficiency and quality assurance, and work on to expansion of business scope for realizing continuous production.

In addition, Yokogawa aims to expand into the bioeconomy field, which Yokogawa has set as a long-term business framework, and would like to contribute to the development of industrialization.

- Life science business
- Bioprocess business
- **Pharmaceutical business**
- Food & Beverage business
- Development of new businesses

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99

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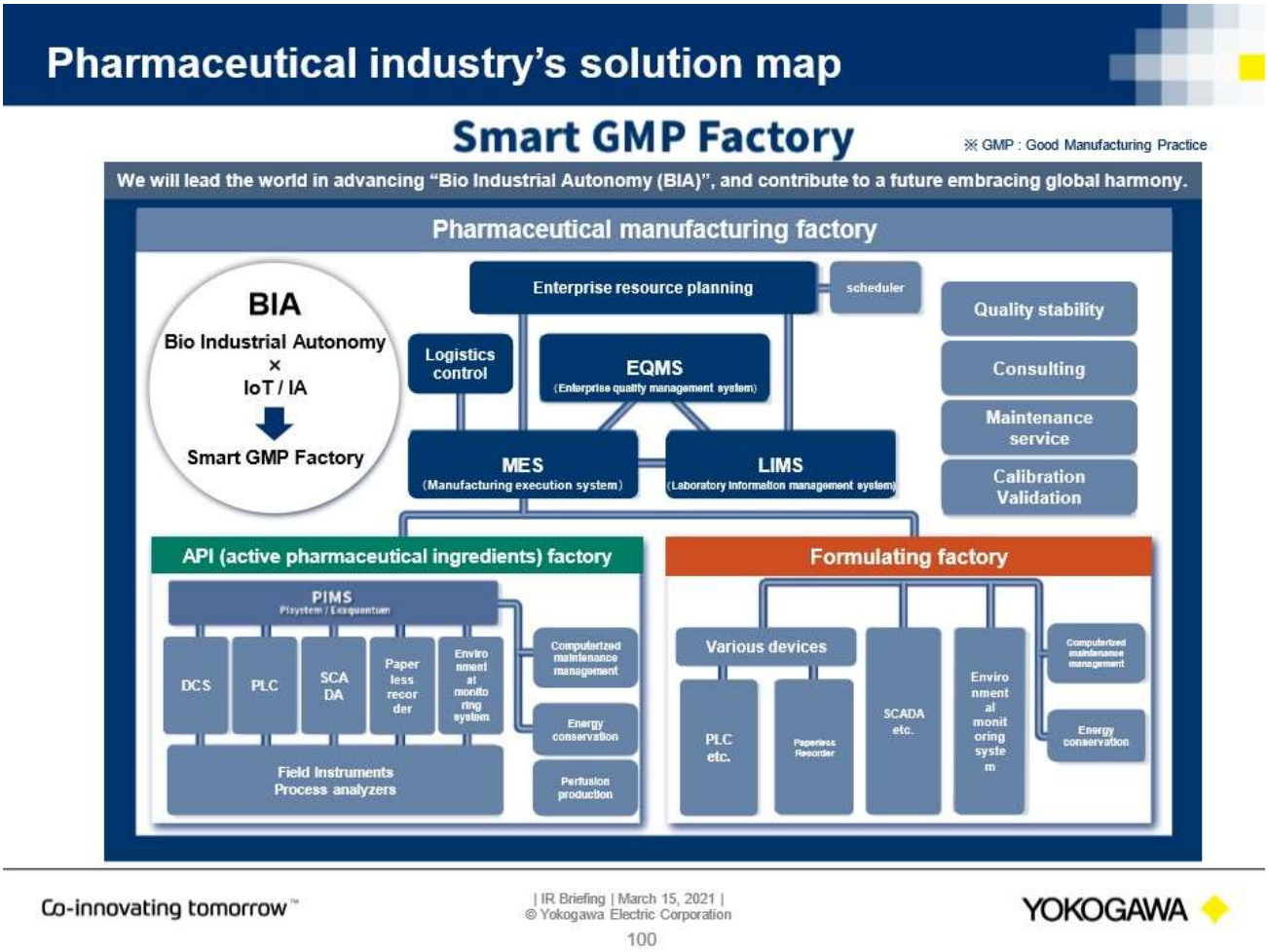
Next is the Pharmaceutical business. Business development in the pharmaceutical production area.



This is a solution map that focuses on pharmaceuticals. In pharmaceuticals, we provide products and solutions such as manufacturing control, quality control and business support centered on API factories and pharmaceutical factories. This contributes to the realization of a smart factory.

Pharmaceutical industry's major case examples
(only one part)

Total solutions
CIMVisionPMS CIMVisionDMS CIMVisionLIMS MaterialStream

- Daito Pharmaceutical Co., Ltd.
- ASKA Pharmaceutical Co., Ltd.

MES
CIMVisionPharms (Manufacturing execution system)

- Mitsubishi Tanabe Pharma Factory Ltd.
- Kyowa Kirin Co., Ltd.
- TSUMURA & CO.
- Mochida Pharmaceutical Plant Co., Ltd.
- ROHTO Pharmaceutical Co., Ltd.

LIMS
CIMVisionLIMS (Laboratory information management system)

- Otsuka Pharmaceutical Co., Ltd.
- Bushu Pharmaceuticals Ltd.
- WAKAMOTO PHARMACEUTICAL CO., LTD.

EQMS
CIMVisionGO (Enterprise quality management system)

- Japan Blood Products Organization

CMMS
eServ (Computerized maintenance management system)

- SHIONOGI & CO., LTD.
- Otsuka Chemical Co., Ltd.

Paperless recorder
(Supporting FDA 21 CFR Part11) DX100P DX200P PERMS

- Foundation for Biomedical Research and Innovation at Kobe
- CMIC Pharma Science CO.,Ltd.
- CHUGAI PHARMACEUTICAL CO., LTD.
- Mercian Corporation

Energy conservation
エコノハイロット-Comp STARDEM

- Bushu Pharmaceuticals Ltd.
- Santen Pharmaceutical Co., Ltd.

DCS
CENTUM VP CS3000 R3 (Distributed control system)

- Merck Biopharma Co., Ltd
- Schering-Plough LTD

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This is part of a major case study for customers in the pharmaceutical industry.

We also provide a large number of product solutions to major companies such as manufacturing execution systems, production control, quality control, and Computerized maintenance management system.

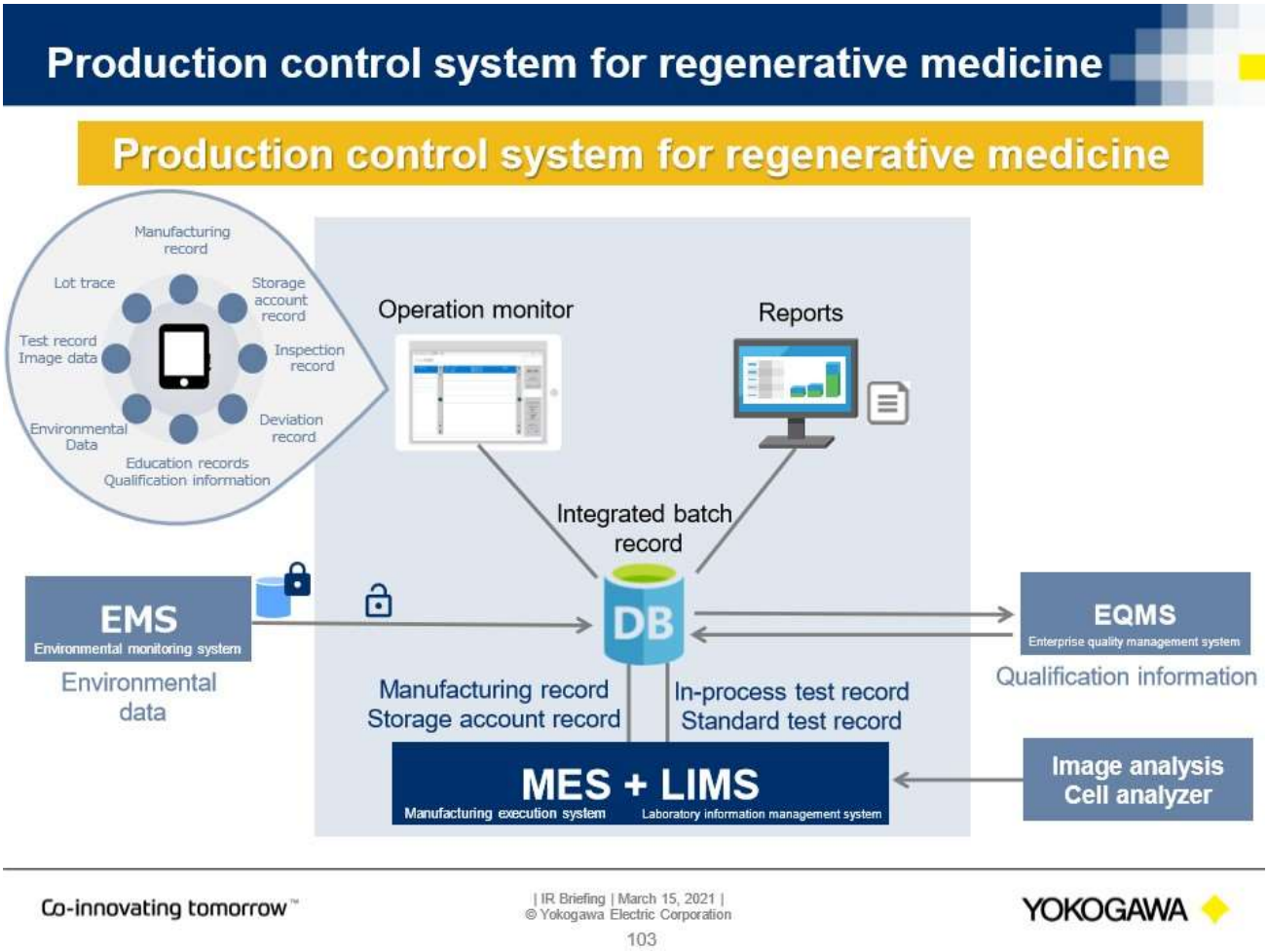
Please refer to our website for specific examples.

In addition, we are promoting the pharmaceutical production business, and in this field, we are promoting activities to expand our domestic knowledge about pharmaceutical production business overseas.

Good Manufacturing Practice, GMP, is said to be the standard for manufacturing control and quality control of pharmaceuticals. In pharmaceutical manufacturing factories, the need for quality activities that comply with GMP is rapidly increasing. In order to respond to this, the laboratory information management system that was deployed in Japan in February 2020, called LIMS, has started to be sold globally under the new name of OpreX LIMS of the OpreX series.

On the right side, in areas such as manufacturing, testing, and storing products from pharmaceutical and medical equipment factories, it is required to record and manage such environmental data such as the temperature and humidity of air conditioning equipment and test equipment, etc., differential pressure between rooms, and fine particles in the air as guaranteed data, in compliance with the regulations such as GMP and quality management system.

In order to deal with these issues, we developed the environmental monitoring system, OpreX Environmental Monitoring System, called OpreX EMS, and just released in October last year in Japan and overseas.



We are also developing a production control system for regenerative medicine.

Various vendors, including our company, have products for production control systems for APIs and formulations, but the raw materials, their manufacturing methods, and quality control methods are different.

Since there is no product in the world that fits manufacturing for regenerative medicine, we are currently developing an optimal solution together with our customers, aiming for completion next year.

- Life science business
- Bioprocess business
- Pharmaceutical business
- **Food & Beverage business**
- Development of new businesses

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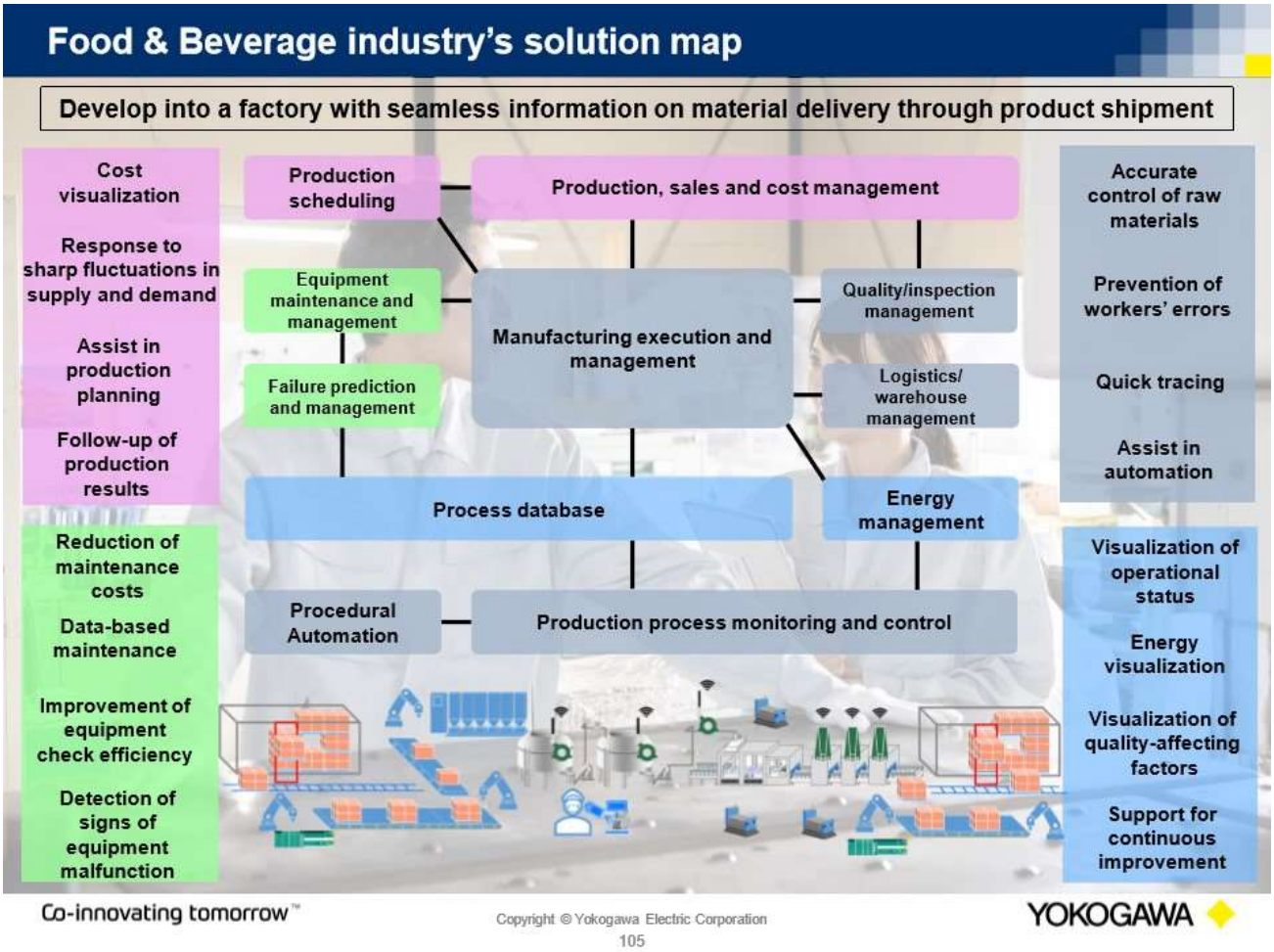
Next is Food & Beverage Business, a business for food production.



This is the solution map of the food industry.

For the

Pharmaceuticals and foods & beverage we are in charge of, we also sell Yokogawa's main products, such as DCS, transmitters, flow meters, etc., but it is also the feature that the percentage of sales of information-related businesses such as production systems, production control systems, quality information management systems, and core systems is high.

For food & beverage customers, we aim to realize a factory that seamlessly connects information from the arrival of raw materials to the shipment of products.

Food & Beverage industry's major case examples
(only one part)

Total solution
PIM-Aid PI System mcframe LIBRA

- Ajinomoto Co., Inc.
- KIRISHIMA SHUZO CO., LTD.

Production scheduler
ASTPLANNER

- Nisshin Foods Inc.

Manufacturing execution system (MES)
LIBRA

- KAGOME CO.,LTD.
- MORINAGA MILK INDUSTRY CO., LTD.

Paperless recorder
DX1000/DX2000 GX10/GX20 DX100P/DX200P

- S&B FOODS INC.
- Mercian Corporation
- Meiji Co., Ltd.

Computerized maintenance management system (CMMS)
eServ

- Mannanlife Co., Ltd.

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Here are some of the key case studies for food & beverage customers.

We are currently providing production schedulers, manufacturing execution systems, recorders, Computerized maintenance management systems, et cetera.

There is also examples on our website, so please refer to it.

Smart factory (X-Model) by digital transformation

- Mechanism that integrates IoT-capable communicative equipment (transport equipment, robots, manufacturing facilities) to ensure efficient operation of each facility and optimal manufacturing practices with a minimal number of operators.
- Mechanism by which digitization of plant information enables real-time and ubiquitous confirmation of the situation
- Analyzing aggregated data to realize further quality assurance, pursuit of safety, presenting KPIs contributing to cost reduction, traceability
- Digitization of indirect work based on these information mentioned above

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107

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This is an example of a food & beverage customer, a story of a smart factory by digital transformation, DX.

This is a new factory that utilizes IoT technology to integrate transport equipment, robots, manufacturing equipment, to improve efficiency and operate with the minimum number of people.

In addition, digitization not only allows the customer to check the situation in real time from anywhere, but also analyzes the aggregated data to ensure quality, pursue safety, and present KPIs that contribute to cost reduction and traceability.

- Life science business
- Bioprocess business
- Pharmaceutical business
- Food & Beverage business
- **Development of new businesses**

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108

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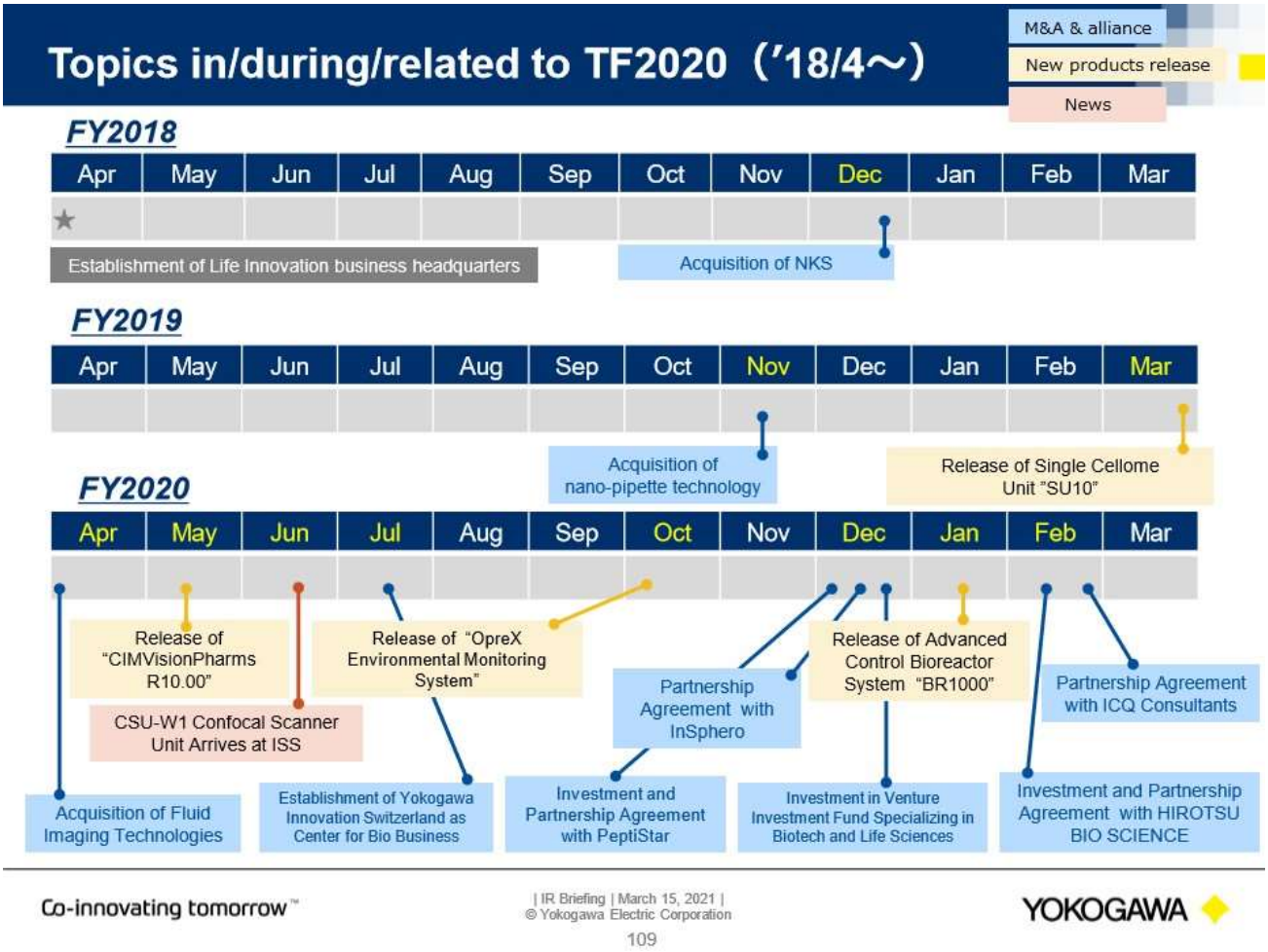
The last agenda item is the development of new businesses, the new business search. I would like to introduce this.



Here is a list of topics related to our Life Innovation Business Headquarters, which was established in 2018.

There were several cases in 2018 and 2019. However, in 2020, as you can see, we have reached the point where we can announce more than a dozen contents.

Above all, those light blue parts are related to M&A and alliances. For example, in December 2018, this is M&A of NKS. In 2019, this light blue is the nano-pipette technology acquisition applied to SU10, which I explained earlier.

In 2020, we first conducted an M&A with Fluid Imaging Technologies in April. Also, in July, as Mr. Abe mentioned earlier, Yokogawa Innovation Switzerland was established. In December, we have signed a partnership agreement with InSphero regarding life science business.

In addition, the investment in PeptiStar was completed in December. Furthermore, we announced that we have also invested in a venture investment fund specializing in biotechnology and life sciences.

In February of this year, we have signed a partnership agreement with ICQ Consultants, an American company. Also, in February, we have signed an investment and partnership agreement with HIROTSU BIO SCIENCE.

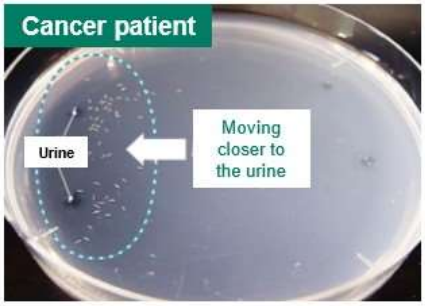
From now on, we would like to continue exploring new businesses through M&A and alliances and aim to further expand the life innovation business.

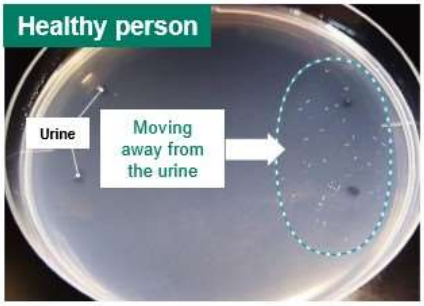
Yokogawa and HIROTSU BIO SCIENCE sign investment and partnership agreement
- Collaboration to widen use of N-NOSE cancer screening test - February 16, 2021

HIROTSU BIO SCIENCE INC.

- Founded : August 2007
- President and CEO : Takaaki Hirotsu
- Business : Research, development, and sale of a cancer screening test that utilizes the olfactory sensory functions of nematodes
- Address : 22F The New Otani GARDEN COURT, 4-1 Kioicho Chiyoda-ku, Tokyo, 102-0094,

Nematodes identify the odor of cancer with great accuracy





Nematodes used in N-Nose

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The investment and partnership agreement with HIROTSU BIO SCIENCE is, as some of you may know, regarding a cancer testing service that uses nematodes, called N-NOSE®.

We believe that this agreement is an important co-innovation activity for “Ensure Well-being”, one of our sustainability goals, and it can make a significant contribution to the realization of a prosperous society.

In the future, we will be responsible for the manufacture and maintenance of the automatic analysis equipment used in N-NOSE®. Both companies are aiming to develop new automatic analysis equipment and promote the global growth of the N-NOSE® business.

This concludes my presentation. Thank you for your attention.

Question & Answer

Q: I would like to know about the mechanism for changing the mindset of employees and the creation of a mechanism for commercializing new fields.

A: We believe that the essence of the digital transformation we are currently undertaking is also a change in our mindset, in other words, our corporate culture. Therefore, we are implementing various transformations, especially those related to personnel affairs. We also believe that IT is the best way to change behavior, and we are doing it on a company-wide level, and it is still ongoing. The plan is ready, and the rest is how smoothly we can do it. IT is ideal for changing behavior, so we are doing that at the company-wide level, and it is still ongoing. We already have a plan. The last thing is how to make it smooth.

Also, for new businesses, we are not aiming for a business size of billions, but we want to do new businesses in the future, such as tens or hundreds of billions, which are comparable to the current core business.

Talents are important to this end. First of all, our Marketing Headquarters is a little different from normal marketing. The headquarters has a R&D department and is also doing new business transformation. This is to get the plan into action immediately. In order to move forward while repeating failures, it is necessary to have various organizations in one organization to some extent. In the future, as the changes in the VUCA world become more and more intense, we cannot do things like in the past, so the Marketing Headquarters is now doing in that kind of system.

Q: Regarding life innovation business, you mentioned that Yokogawa aims for sales of two to three times of JPY12 billion in FY2017 by this term. How were the actual sales? How much did the business contribute to the profit? How much is Yokogawa likely to grow in the next mid-term business plan?

A: As for the size of life innovation business, the target of 2 or 3 times the FY2017 level should be almost achieved in FY2020. Furthermore, in the next medium-term business plan, we believe that the target will be approximately twice that amount.

Q: Regarding the business model, the bioreactors and injectors you mentioned are basically equipment oriented, and are there any consumables or aftersales?

A: For example, the nano-sized pipette for SU 10 we just introduced is a consumable. To put it simply, if a customer uses it for one experiment, the customer will consume one. Therefore, for example, if there are 100 cells, the customer will basically be using 100 pipettes, so we are considering a business model considering such a consumables business. And we are also considering applying DX-powered subscription business to our products and solutions as much as possible in the future.

Q: Could you explain the strengths and weaknesses of the five businesses you introduced to us in terms of how quickly they contribute to the business and how they have the potential to grow?

A: What we think is fastest is the solution business for customer production. Yokogawa has been developing this business mainly in Japan, but now it is starting to expand this business overseas. Yokogawa is best at activities for production and has resources on a global scale. We aim to expand this business while directing the resources to the pharmaceutical and food fields and while educating the resources. From this point of view, I think that the speed of this business is the fastest.

Potential for the life science business is increasing year by year, but there are still not enough resources in the main battlefields such as U.S. and Europe. We think there is still a lot of potential here, so we are thinking about further strengthening our resources and marketing.

Q: Could you tell us about Yokogawa's advantage over other companies in the overseas expansion of production control of the food & beverage and pharmaceuticals?

A: We have been expanding the control system business globally for decades, centered on oil and gas customers, and there is such a foundation.

Also, we are confident in engineering power. We will develop such resources in the pharmaceutical and food & beverage business that we have done overseas. Moreover, Mr. Abe introduced the story of IA2IA, which is our strength, at the end of last year. We think that one of our strengths is the cooperation and development of solutions with our customers' Autonomy in mind.

In addition, we are looking at the value chain from the upstream, life science business, to the production, and we think that this is an area that other companies cannot easily do.

Q: I think that Yokogawa still has strengths in high-content analysis. Is there already any concrete example that the high-content analysis is linked to the control system for production?

A: We are still considering how we can provide added value to our customers. I think the time to talk it will come soon.

A: I would like to add some comments.

SU10 and the biocontamination solution are, in a sense, a measuring instrument, but we do not think we will end up with just a measuring instrument. For example, when the time of the bio-contamination becomes 1 Hour from the unit called “day” such as5 Days and 7 Days, a flow control 2will be possible. Today's food & beverage and pharmaceutical industries are mostly doing batch processing, and this is a big obstacle to improving productivity. Oil & gas is already flow controlled, so we are hoping to bring flow control to the food& beverage and pharmaceutical fields.

In addition, although this is still under consideration, we have the concept of smart plant and smart manufacturing, and we would like to propose the ultimate multi-product variable production. To achieve this, we need to make the plant more compact and flexible by modularizing the plant. If it can be made compact, it can be made in the production area. We think we can also provide a solution for local production for local consumption. In other words, a microgrid-like way of thinking, such as creating a small factory in a place where a lot of raw materials can be obtained and producing there. We want to make a big transformation in manufacturing as well. Of course, this cannot be done by Yokogawa alone, so we are already talking about it with the people involved. Once the plan is finalized, we would like to introduce it again.

Q: In the field of food & beverage and pharmaceuticals, I feel that it is necessary to comply with the regulations of each country. In this regard, do overseas competitors have an advantage in overseas markets?

A: No, even for products that we develop in Japan, if Japanese customers are exporting to overseas, for example, the FDA in the United States will come to Japan for inspection. Therefore, it is already necessary in Japan to comply with regulations such as FDA or PIC/S. We think that such a preparation is basically done.

Q: Regarding the scale of the life innovation business, the life science business reported sales of around 3 billion yen. Could you tell us the breakdown and percentage of the rest of the business?

A: As for sales, life science is about 15% now. The production is about 60%. The rest is the portion of M&A.

Q: Could you explain the profitability of the life innovation business and the way of thinking about future investment?

A: Regarding profitability, we do not release any data on profitability currently, so please forgive us for this.

The production-related businesses and life science-related businesses are profitable. So, it is not bad as a whole.

Thinking about the future, we think the next three years will be a very important period. However, not only for three years, we have to look ahead to the next ten years. So, investment in non-organic growth with a focus on M&A is also an important part, so we must focus on that as well.

[END]

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