SONY

New Services Briefing

**Senior General Manager, System Solutions Business Div.
Sony Semiconductor Solutions Corporation**

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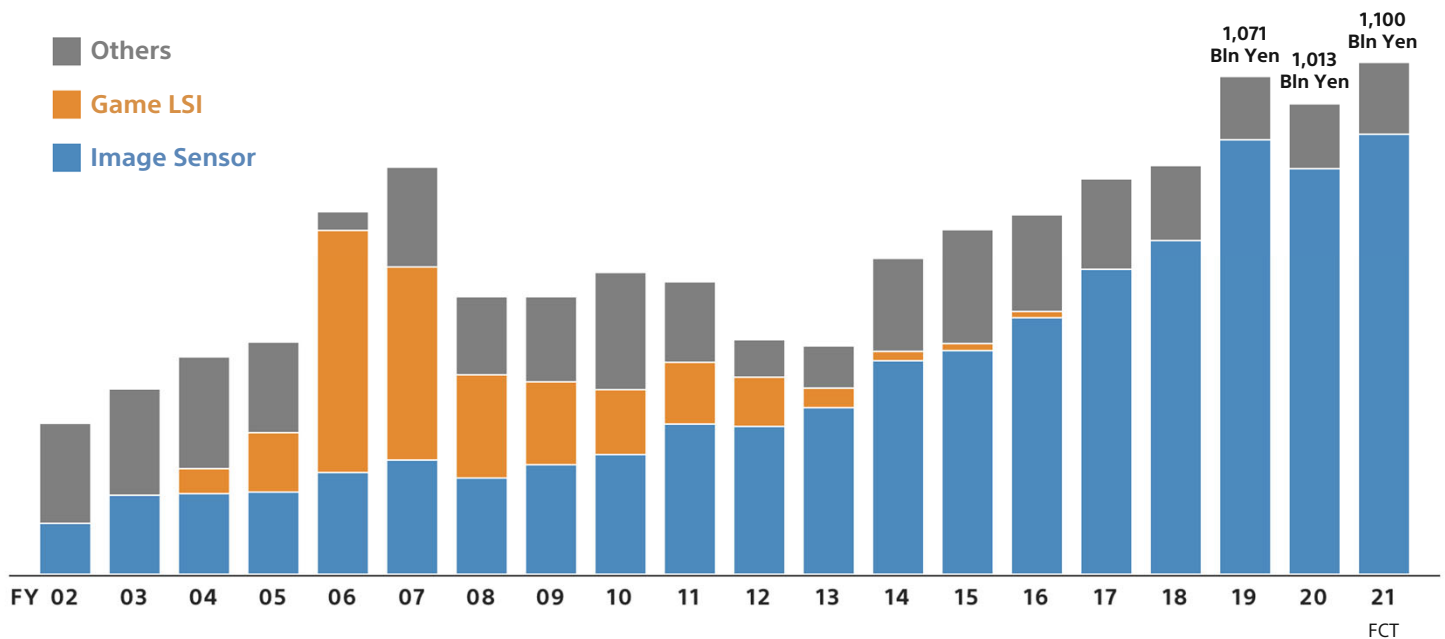Hello, everyone. My name is Yanagisawa from Sony Semiconductor Solutions.
Today, we would like to announce our new service. First, please watch this video.

*Please watch the video from presentation materials listed on Sony Semiconductor Solutions Corporation's information website.

Before going into the details of this new service "AITRIOS", let me explain the business overview of Sony's Imaging & Sensing Solutions (I&SS) and the positioning of "AITRIOS" that we are starting this time.

Imaging & Sensing Solutions: Sales Over Time

- Others
- Game LSI
- Image Sensor

FY 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21
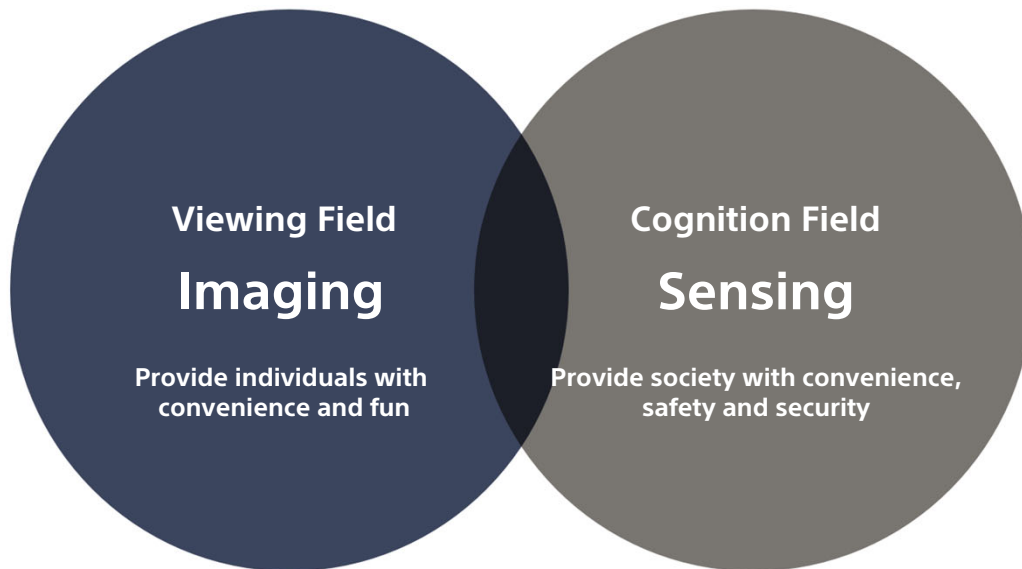FCT

19: 1,071 Bln Yen
20: 1,013 Bln Yen
21: 1,100 Bln Yen

I&SS Business Overview, I&SS Mid-to-Long Term Strategy

First, let's take a look at the sales composition of the I&SS business since the 2000s.
You can see that the focus shifted clearly to image sensors. In the most recent fiscal year, image sensors accounted for about 86% of the total sales value.

Imaging & Sensing

Viewing Field

Imaging

**Provide individuals with
convenience and fun**

Cognition Field

Sensing

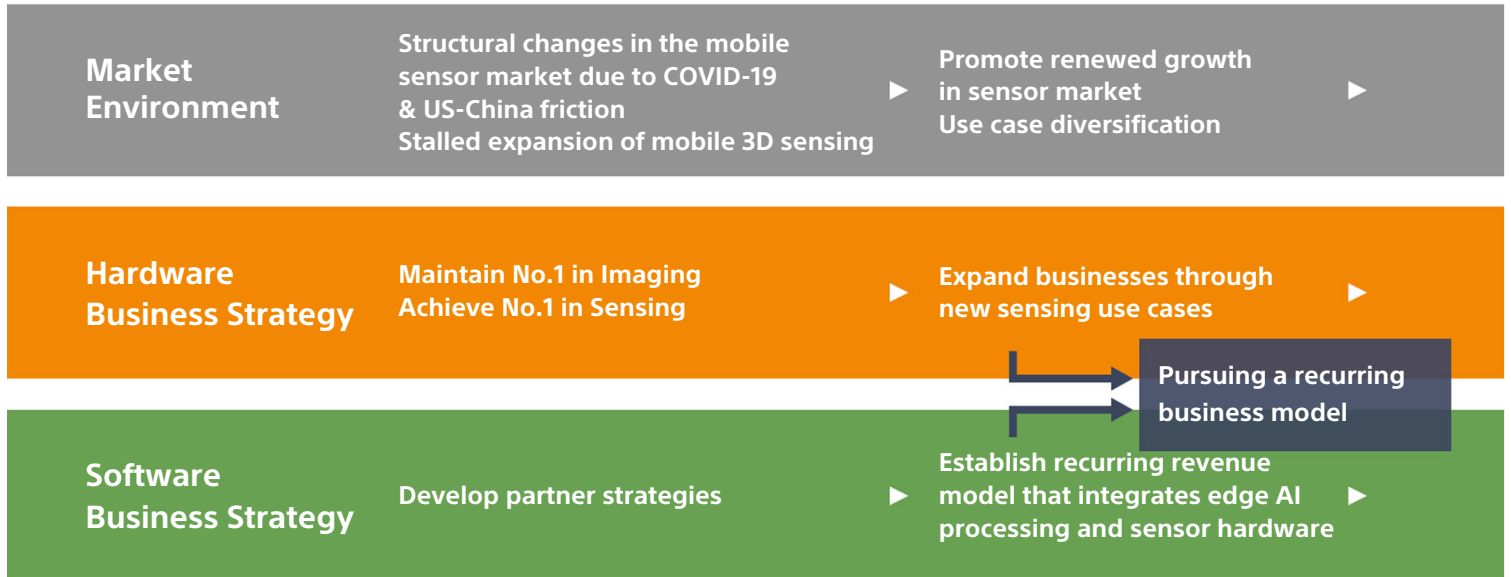**Provide society with convenience,
safety and security**

Currently, the image sensor market is supported mainly by the mobile imaging field, which refers to technology that captures images for the human eye to see.

Meanwhile, sensing filed, which refers to technology that extrapolates information from captured images, is expected to grow significantly in the mid-to-long term.
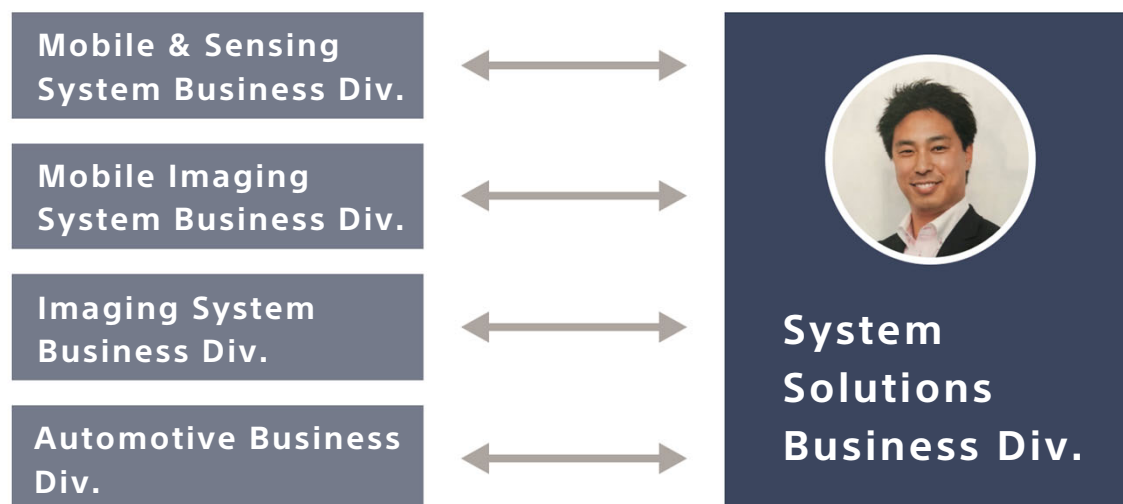
I&SS   Mid-to-long term strategy

	FY 19-21		**Beyond FY21**	
Market Environment	Structural changes in the mobile sensor market due to COVID-19 & US-China friction Stalled expansion of mobile 3D sensing	▶	Promote renewed growth in sensor market Use case diversification	▶
Hardware Business Strategy	Maintain No.1 in Imaging Achieve No.1 in Sensing	▶	Expand businesses through new sensing use cases	▶
Software Business Strategy	Develop partner strategies	▶	Establish recurring revenue model that integrates edge AI processing and sensor hardware	▶

Pursuing a recurring business model

We have also announced that since 2019, I&SS's mid-to-long term business strategy is to focus on the software business in addition to hardware, pursuing a recurring revenue model.

Establishment of System Solutions Business Div. (2019.6.1)

Integrates the solutions functions of each image sensor business unit

Establishing the System Solutions Division

In order to realize this mid-to-long term business strategy, we launched the System Solutions Division in June 2019, and I have been serving as the senior general manager since this month. By integrating the system solutions-related functions of each business unit, this division aims to expand the value chain of the image sensor business by integrating our industry-leading image sensor with software, systems, AI processing, etc.

This division will expand its business domain from the "product sales" business of sensors to "services sales" that incorporate the recognition capabilities of sensing technology, or in other words, to the solutions businesses.

AITRIOS

Now, I would like to explain our new service "AITRIOS" which was introduced in the video you have seen. "AITRIOS" is a new service that will be a major step forward in promoting mid-to-long term business contribution through both hardware and software.

Sony will begin offering its edge AI sensing platform AITRIOS from late 2021, starting with Japan, the United States and Europe. This platform is intended to support partners in efficiently developing and implementing AI camera-driven and other sensing solutions.

The first step in the service entails providing a one-stop environment that offers various features and products that will make it easy for partnering solution providers to build solutions spanning from edge to cloud.
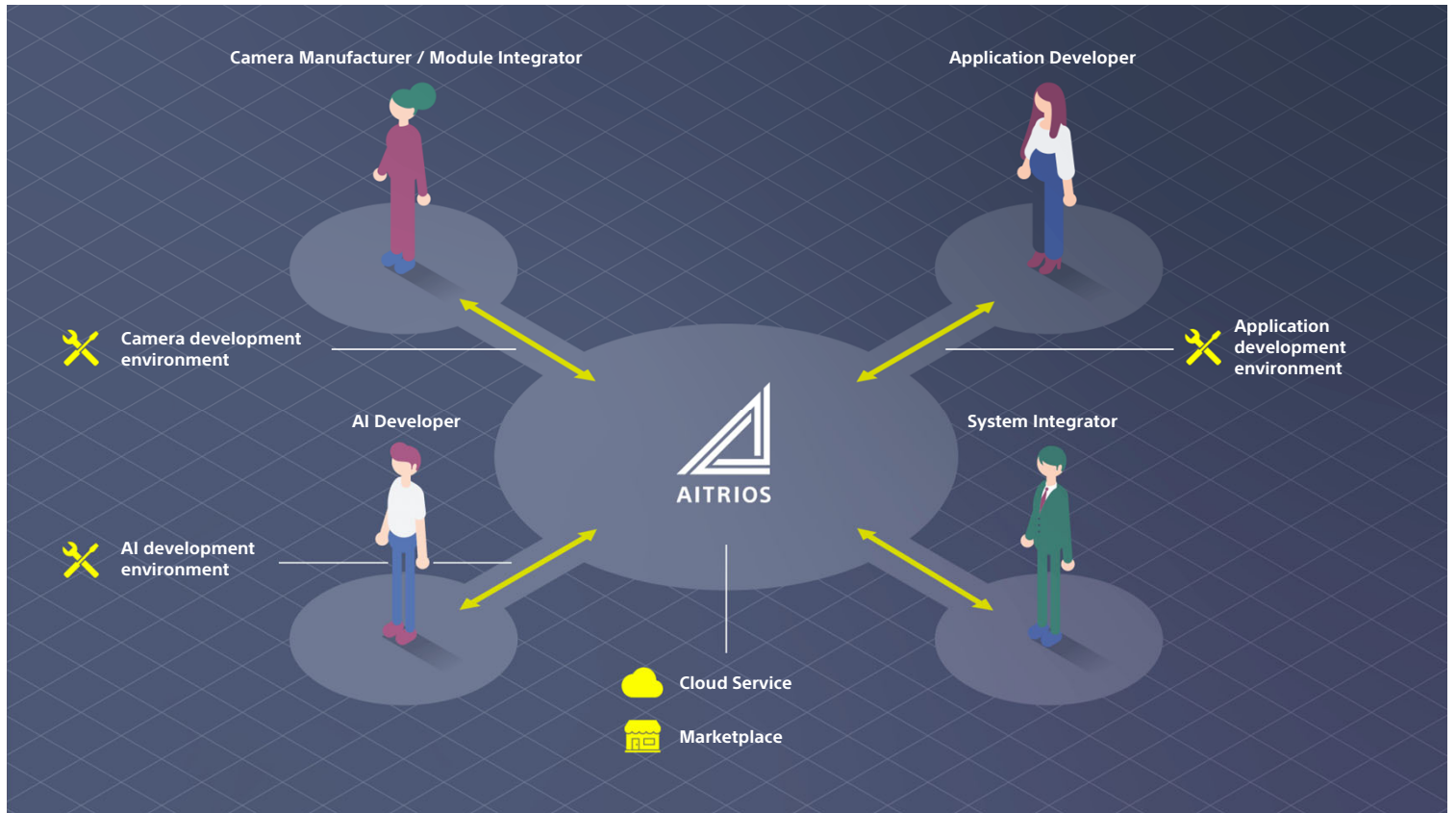
Strengths of AITRIOS / Realizing a New World

A variety of functions and products necessary for realizing sensing solutions will be provided to partners, such as AI developers who develop AI running on AI cameras, application developers who develop vision applications using AI, camera manufacturers and module integrators who develop AI cameras, and system integrators who integrate these AI cameras and applications to build systems.

Using the technology cultivated in Sony's specialty image sensor area, we can provide a one-stop environment that enables easy construction of sensing solutions, ranging from the edge to the cloud, in addition to data output optimized for AI. This enables partners to efficiently develop and implement high-performance solutions and applications tailored to their specific needs.

A world in which a variety of IoT devices are connected to the cloud

A huge amount of information and data will flow from various devices to the cloud, causing a data explosion.

Cloud

Data Explosion

Data communication limit

Business Environment and Potential Challenges

To have your understanding on why we are offering this new service, from here, I will go over the business environment and the potential challenges we may face as we pursue these initiatives.

First, I will explain the synergy of "the edge" and "the cloud," which is the key to expanding sensing solutions.

With the recent evolution of AI, the spread of the Internet of Things (IoT), and the acceleration of digital transformation (DX), there is a growing need to use sensing technology, which extrapolates data from images captured by image sensors, to provide new value and solve business problems. At the same time, with the rapid expansion of IoT devices connected to networks, such as smartphones, home appliances, and cars, there are concerns about over-reliance on cloud systems to support them. Under these circumstances, the construction of systems that distribute the processing load between the cloud side and the edge side, such as IoT devices, is attracting attention as a means to solve the problems of cloud systems.

The world we hope to attain with edge and cloud synergy

1. Control of data volume
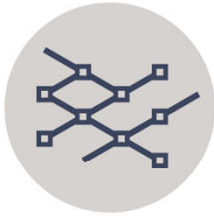
2. Addressing privacy concerns

3. Reduction of electric power consumption

4. Improvement of latency

5. Service continuity

6. Strengthening security

You are now seeing six challenges that are aimed to be solved through the synergy of the edge and the cloud.

In order to meet these six challenges, we believe that it is essential to achieve optimal system construction in which the edge and the cloud function in synergy, without relying solely on the cloud, in order to promote the spread and expansion of sensing solutions.

Intelligent vision sensor

IMX500 is the world's first intelligent vision sensor equipped with AI processing functionality
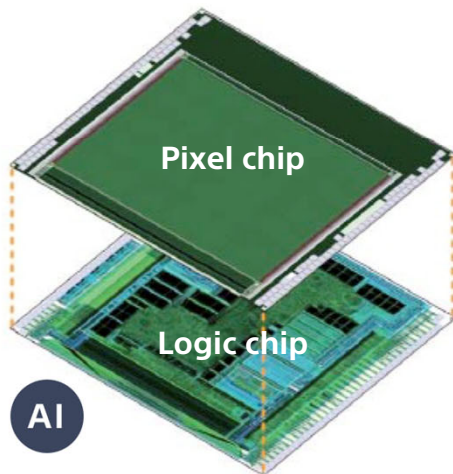
Main functions on the logic chip

-Conventional image sensor operation circuit

-ISP which processes the image signal

-Original DSP dedicated to AI signal processing
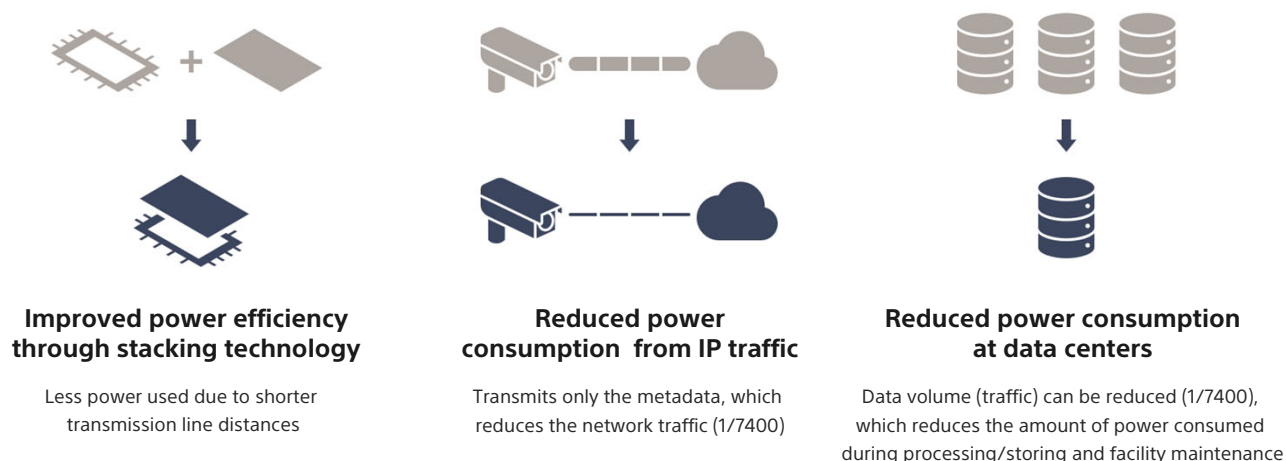
-Memory for the AI model

→Eliminates the need for high-performance processors, and reduces the number of peripheral components

Based on the recognition of this issue, Sony commercialized the world's first intelligent vision sensor with AI processing functionality, the IMX500, in May 2020.

The IMX500 uses a stacked configuration consisting of a pixel chip and a logic chip, which is the core technology of Sony's image sensors, and is equipped with Sony's proprietary DSP (Digital Signal Processor) mounted on the logic chip. This enables AI processing on the image sensor, the edge-most device, which serves as the entry point for image data.

Advantages of the intelligent vision sensor IMX500

Reduces power consumption by minimizing data volume

Improved power efficiency through stacking technology	Reduced power consumption from IP traffic	Reduced power consumption at data centers
Less power used due to shorter transmission line distances	Transmits only the metadata, which reduces the network traffic (1/7400)	Data volume (traffic) can be reduced (1/7400), which reduces the amount of power consumed during processing/storing and facility maintenance

As I mentioned at the Sony Group's ESG Briefing held on September 15 this year, IMX500 is also expected to make a significant contribution to the environment.

The use of a stacked configuration not only improves the power efficiency of the sensor itself, but also reduces the electric power required for IP traffic by outputting only semantic metadata information, while also reducing the electric power required for processing, storage, and facility maintenance at the data center.

Since the release of the IMX500 last year, we have been promoting the provision of sensing solutions using sensor AI for various industries to capitalize on market potential. On the other hand, in light of the current rapid pace of technological evolution, there is a limit to how much Sony alone can provide solutions, and we have come to understand that it is essential to expand the use cases and collaborate with external partners.

And this is why Sony is involved in software as well as hardware.

Promoting and expanding sensing solutions

Difficulties in data handling have caused <mark>a bottleneck in solutions</mark> development

Image sensor

Solutions

Data →

→**Limited promotion and expansion of solutions**

Promoting and Expanding Sensing Solutions

There is another current situation that we recognize as a challenge. That is, compared to the general spread of various IoT devices and solutions that utilize them, solutions that utilize "vision sensing," which is our main target, have yet to become widespread.

In addition to the over-reliance on cloud systems that I mentioned earlier, I believe there is another major factor preventing the spread of "vision sensing." Essentially, the image sensor, requires an overwhelmingly large amount of data compared to other IoT devices, making it extremely difficult to handle. This is a barrier to entry for partners, such as system integrators and developers, who are responsible for providing solutions.

Promoting and expanding sensing solutions

Sony will provide a platform that enables efficient development and implementation of solutions

Image sensor
Solutions

Data → AITRIOS →

→**Promotion and expansion of solutions**
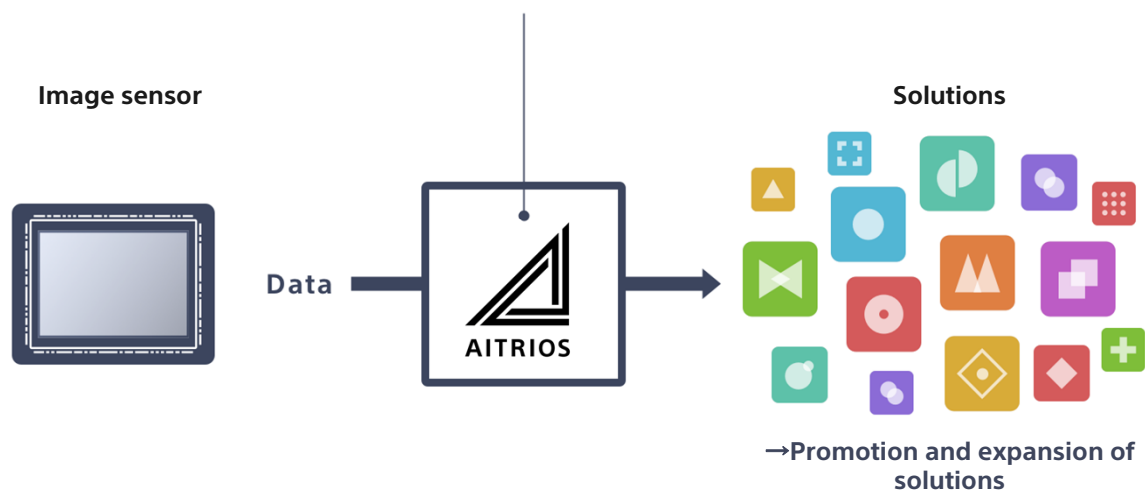
We believe that Sony's technological capabilities will help to remove this barrier. Sony's ability to provide a "platform" that enables partners to efficiently develop and implement solutions will help solve the problems associated with the promotion and expansion of sensing solutions.

This is because we have a wide variety of image sensors backed by the world's best technology in this area. This is our greatest strength, and the technology and knowledge we have cultivated with our various image sensors enables us to output optimal data for AI processing, and to maximize the performance of solutions developed using them.
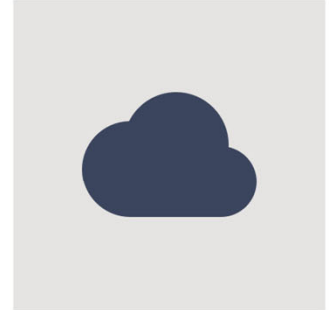
An example of AITRIOS features

Development environment

SDKs and tools to help partners develop more efficiently

Marketplace

Register AI and applications developed by developers, and allow partners and users to download and use them

Cloud service

Various cloud services to efficiently implement solutions

An Example of AITRIOS Features

Here is an example of the main features we offer with AITRIOS.
The functions provided can be divided into three major categories: development environment, marketplace, and cloud services.

The development environment refers to SDKs and tools to help partners such as AI and application developers, camera manufacturers and module integrators to achieve efficient development. By providing the development environment, we will support the development of partners who will create solutions.

Marketplace refers to a function that will allow developers to register their AI and applications, and partners and users to download and use them. As more and more AI and applications become available, we will become able to develop solutions that meet a variety of needs, and as this marketplace grows we expect to see the development of a virtuous cycle that will attract even more partners and users to the platform.

We will also provide various cloud services for partners, mainly system integrators who are responsible for final system construction, to efficiently implement solutions. For example, we are working on a function to implement applications downloaded from the marketplace on the IMX500, a function to retrain AI models according to changes in the usage environment and conditions, a function to manage AI cameras, and a function to easily connect applications on external cloud services via APIs provided by AITRIOS.

The further potential of AITRIOS

requiring a large number of man-hours to develop solutions

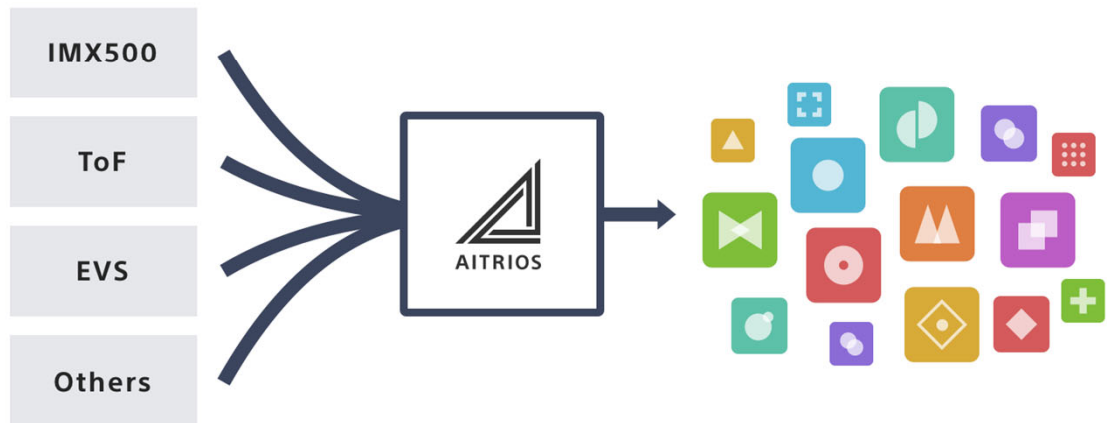| IMX500 | → | ● |
ToF	→	▲
EVS	→	◆
Others	→	✚

The Potential of AITRIOS

What we have introduced today is just the first phase of services to be offered in AITRIOS, and this is just a part of the overall concept. Here is one example of our future plans.

I mentioned earlier that it can be difficult to manage the data of image sensors, but on top of that, there are so many different types of sensors out there, and each sensor requires a different environment to develop applications and solutions, which is a problem that requires a lot of resources.

The further potential of AITRIOS

<mark>AITRIOS will support the development of solutions with various types of sensors</mark> by providing a user-friendly environment that is independent of the type of sensor

To solve this issue, we are developing AITRIOS to be compatible not only with IMX500, but also with a diverse range of sensors provided by Sony.

We will continue to expand the services of this platform so that our partners can efficiently build solutions that utilize a variety of sensors.

Sony's greatest strength is its image sensors, and we believe that our position as the industry leader in image sensing combined with the technology and expertise that we have cultivated over the years make working on a project such as this a no-brainer.

AITRIOS

AI + trio+S

AI ——————— [   ] [   ] ——————— Solution
                                        Social Value
                                        Sustainability

Origin of the name AITRIOS

As the last part of my presentation, I'd like to explain that the name "AITRIOS" was coined from the combination of "AI," the keyword of this service, and "trio S," which means "three S's."
The three S's, in turn, stand for the "Solutions," "Social Value," and "Sustainability" that Sony will provide to society through AITRIOS.

Towards a future where image sensors support our everyday life all over the world

For image sensors to become more and more indispensable in solving customers' problems across a variety of industries, and to realize a future in which image sensors support our everyday life all over the world, we will launch and continue to evolve our AITRIOS service.

Thank you for your attention.