

OLYMPUS Technology Strategy for ICT-AI Platform

Customer-value Creation Utilizing ICT-AI technology

March 13th, 2019

Senior Executive Managing Officer

Chief Technology Officer

Ogawa Haruo

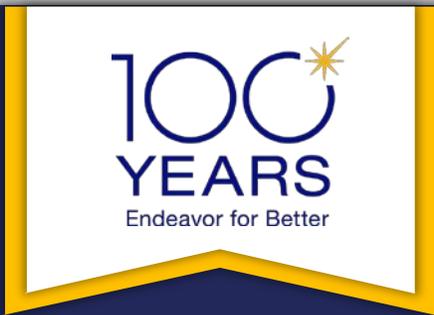
- 1: Olympus' New Management Philosophy**
- 2: Challenges in Innovation**
- 3: ICT-AI Technology Initiative**
- 4: ICT-AI Technology Platform Strategy**

1: Olympus' New Management Philosophy

2: Challenges in Innovation

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4: ICT-AI Technology Platform Strategy



Scientific Solution Business



1920

Imaging Business



1936

Medical Business



1952

OUR PURPOSE
**Making people's lives healthier,
safer and more fulfilling**



“Business to Specialist” Company

Perfect solutions to respond to customer expectations from a higher dimension.

The competence Olympus demonstrates has been fostered through a long history in the business.



to be the greatest **“Business to Specialist”** Company

- 1: Olympus' New Management Philosophy
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Medical

Importance of value with high economic benefits, medical effects, and patient satisfaction



■ Formulate new medical solutions for realizing customer value

Shared

Appearance of “innovator’s dilemmas” resulting from new technological revolutions



■ Transition from process innovation era to product and business innovation era

• Redefine “Business to Specialist” business process (utilize ICT,etc)

Shared

Improvement of development efficiency through cross-business application of technologies



■ Utilization of 4K and 8K technologies, robotics technologies, deep learning, ICT, and other technology trends

• Proactively form alliances and promote “open innovation”

- 1: Olympus' New Management Philosophy
- 2: Challenges in Innovation
- 3: ICT-AI Technology Initiative**
- 4: ICT-AI Technology Platform Strategy

On OLYMPUS Investor Day 2017(September 13th, 2017), Our Innovation Technology (ICT/AI technology) Initiative was Announced

8. R&D Activity Examples

V. Report and evidence technologies: +ICT Strategy

Provide services from cloud servers through +ICT strategy (Images, diagnosis data, equipment logs)



Contributions to Quality Medical Treatments

- a. Diagnosis support (utilizing AI)
- b. Report preparation support
- c. Reprocessing and other work support
- d. Training support

Cloud services

Contributions to Medical Economic Benefits

- a. Equipment maintenance and symptom management (utilizing IoT)
- b. Appropriate use of consumables
- c. Cost optimization through pay-per-procedure model

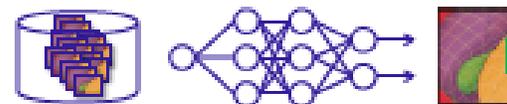


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8. R&D Activity Examples

III. Recognition and analysis technologies: Utilization of AI for Examination and Di

Utilization of AI (Deep Learning)



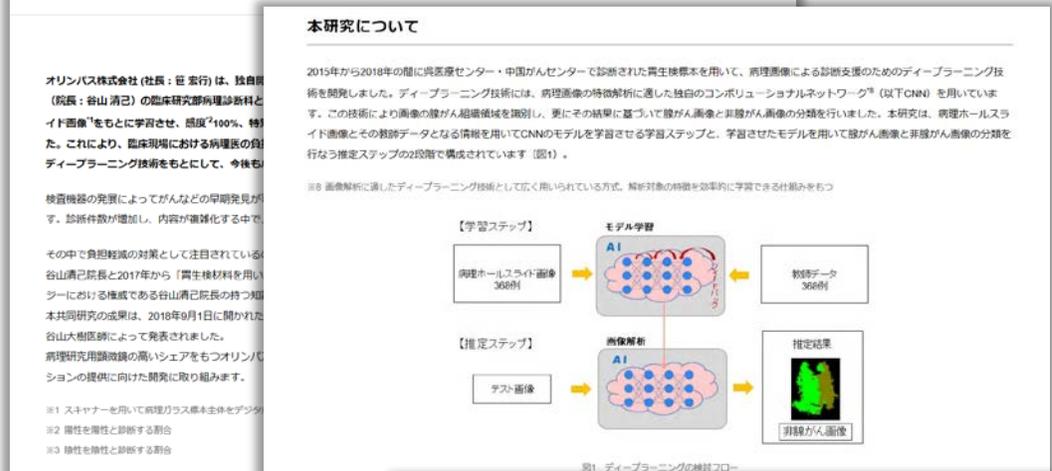
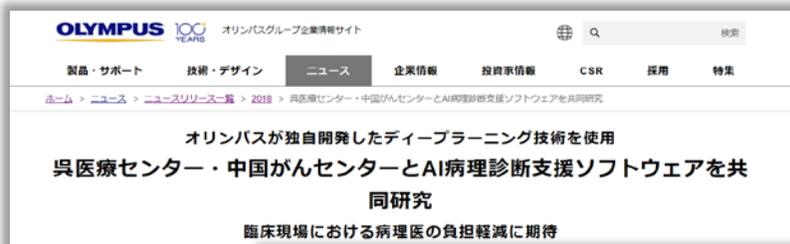
Take advantage of superiority of customer contact pol achieved through leading endoscope market sh to collect data on endoscopy image data fro around the world

In a development phase

現在の入力データは、基礎研究段階の
本動画は研究結果例であり、医療機器の紹介ではありません



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News Release : Announced on September 3rd, 2018

Utilization of the original deep learning technology developed by Olympus

AI supported medical diagnostics software research was conducted in collaboration with Kure Medical Center/Chugoku Cancer Center. Expected to ease the burden of medical doctors at medical sites.

OLYMPUS

100
YEARS

News Release

March 7th, 2019

The collaborative development project by Olympus, Oita University, and Fukuoka Institute of Technology played a role in the success of the world's first AI guided surgery*

~ Software developed for generating training data of surgical endoscope images for AI ~

Along with Oita University and Fukuoka Institute of Technology, Olympus Corporation (President: Hiroyuki Sasa) participated in the project called "Development of Medical Devices and Systems for Advanced Medical Services" initiated by the Japan Agency for Medical Research (AMED), and succeeded in collaborative development of a "medical system using AI to assist the surgeon's decision making during surgery" (research head: Professor Masafumi Inomata, Oita University Faculty of Medicine). In this project, Olympus has developed software that effectively generates organs and blood vessels in endoscopic images during LC. Conventionally, linking information had to be manually entered in thousands of images, however, by using this software, the burden of such a task could be greatly reduced, and the AI was able to learn higher quality training data.



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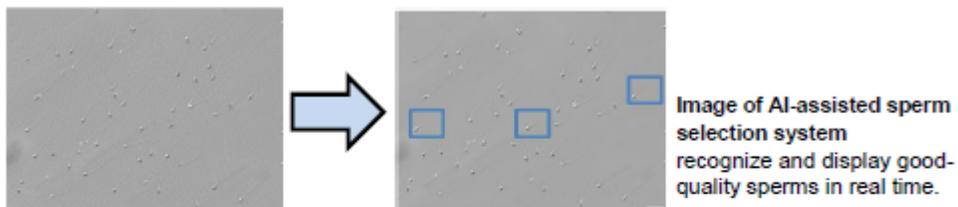
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NEWS RELEASE

March 8, 2019

New Collaboration between Olympus and the Jikei University School of Medicine to Develop AI-Assisted Sperm Selection Aims to Reduce the Workload in Intra Cytoplasmic Sperm Injection (ICSI)
Research will make it easier for embryologists^{*1} to select good sperm

Olympus Corporation (President: Hiroyuki Sasa) is participating in a collaborative ICSI research project with the Jikei University (President: Satoshi Kurihara, hereafter referred to as the Jikei University School of Medicine). This program aims to reduce the workload in ICSI and standardize the process by developing artificial intelligence (AI)-assisted sperm selection, which supports embryologists in selecting good-quality sperm.



The ICSI system is based on the Olympus IX3-SLICSI inverted microscope

This ICSI system realizes fast, accurate operation. With the push of a button, an operator can easily switch to between the observation methods and magnifications necessary for ICSI. It features a spindle observation function that can instantly determine the maturity of an oocyte, which is important for ICSI.

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Interchangeable Lens Camera
OM-D E-M1X

Overview | **Features** | Specifications | Design | Sample Images | Accessories

Reliability | **AF System** | High-speed Performance | Excellent Image Quality | System Expandability | OM-D Movie

Intelligent Subject Detection AF

Developed using deep learning technology, the algorithms in Intelligent Subject Detection AF system allow the camera to detect specific subjects. Through the inclusion of two TruePic VIII image processors, real-time processing of the subject detection is possible which allows the camera to focus and track the optimal point of specific subjects for enhanced shooting accuracy.

*Only enabled for C-AF+TR.
**May not be detected depending on the subject or may be erroneously detected.

Subjects detectable by Intelligent Subject Detection AF

Motor vehicles: Formula cars, rally cars, motorcycles with Pinpoint AF on the driver's helmet.

Aviation: airplanes, helicopters with Pinpoint AF on the airplane cockpit.

Railway: bullet trains, trains, steam locomotives with Pinpoint AF on the train conductor's seat.

From the HP of OLYMPUS OM-D E-M1X



Mirrorless single-lens flagship camera
OM-D E-M1X

Examples of how Intelligent Subject Detection AF will appear to the photographer

□...1 □...2

□...1

Utilizing Deep-Learning Technology Intelligent Subject-Tracking AF

Automatic detection of specific subjects to adjust to the optimal focus point and tracking.
Real-time processing is realized by two TruePic VIII image processing engines.

3:ICT-AI Technology Initiative



AI solutions for gastrointestinal cancer screening

HOME VISION TEAM SOLUTIONS PRESS CONTACT

OUR TEAM

ai4gi is a commercial initiative which leverages the expertise of highly experienced Learning as applied to the detection and treatment of gastro-intestinal cancer. This from Imagia Inc.

ai4gi enjoys the oversight and guidance of a seasoned advisory board chaired by Dr. fortunate enough to have Dr. Pradeep Bhandari, Dr. Helmut Neumann, and Dr. Coli



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Home > Our Company > Press Center > Olympus Announces Co-Development Agreement with ai4gi

Press Center

NEWS CENTER

Olympus Announces Co-Development Agreement with ai4gi

Return to Press Center

CENTER VALLEY, Pa., (May 7, 2018) – Olympus, a global technology leader in designing and delivering innovative solutions for medical and surgical procedures, among other core businesses, announced today its co-development agreement with ai4gi, a commercial joint venture between Satis Operations and Imagia. Their Artificial Intelligence (AI) solution for real-time clinical decision support during screening and surveillance colonoscopy procedures will be exclusively offered by Olympus America Inc. (OAI). This co-development agreement is intended to raise the bar for all physicians to ultimately improve clinical outcomes, reduce overall costs and enhance quality of life for patients.

The integration of AI into the colonoscopy procedure holds great promise for the future of GI screening for physicians and patients. Ai4gi initially developed this clinical decision support tool using a large volume of unaltered endoscopic colonoscopy videos from global physician experts in combination with deep learning training models. By incorporating AI, Olympus is investing in technology that will elevate all clinicians while unlocking new ways to treat disease for patients. This is the first co-development agreement of its kind in the U.S. market and is the first time an AI proof-of-concept has been demonstrated clinically in real-time in a screening colonoscopy application.

Colon cancer continues to be a major health issue in the U.S. According to the American Cancer Society, approximately 140,000 Americans—men and women—are diagnosed with colon cancer every year, and over 50,000 die from the disease. While colorectal cancer (CRC) is the second leading cancer killer in the U.S. among men and women combined, it is the most detectable and treatable form if detected early. Olympus is the leading manufacturer of medical devices used to peer inside the human body to help medical practitioners detect, diagnose, and treat gastrointestinal diseases such as colon cancer.

"ai4gi's solutions to early colon cancer recognition are going to be a game-changer in the field of Gastroenterology" said Dr. Michael Byrne, CEO of Satis Operations and Clinical Lead at ai4gi. "These solutions are what the industry needs for more timely and more effective patient care, and Olympus is an ideal industry partner to drive clinical adoption of this technology. As doctors, we all need help to improve our practice, so why not use the best technology available?"

"We are thrilled to add Artificial Intelligence to our already powerful endoscopy portfolio which we feel is an emerging and essential core competency in this space," said Kurt Heine, Group Vice President of the Endoscopy Division at Olympus America Inc. "Our vision is to add Artificial Intelligence to our platform to improve the assessment of colon cancer screening as well as potentially other endoscopic procedures. Better visibility, along with increased efficiency, can bring us closer to our goal of improving quality of care, reducing healthcare costs and enhancing patient satisfaction."

"We are excited about the potential of our clinical AI solutions to promote paradigm shifts in the standard of care for endoscopic procedures," said Frédéric Francis, CEO of Imagia. "The clinical decision support from AI may benefit patients by enabling physicians to better predict polyp histology in real-time."

Olympus and ai4gi's collaboration will be highlighted at the largest annual Gastroenterology conference, Digestive Diseases Week (DDW), in Washington DC, June 2-5, 2018, booth #2833.

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About Olympus Corporation of the Americas

Olympus is a global technology leader, crafting innovative optic and digital solutions in medical technologies; life sciences; industrial solutions; and cameras and audio products. Our solutions enable specialists to look inside the human body, further scientific research, ensure public safety and capture images of the world. Throughout our nearly 100-year history, Olympus has focused on being true to society and making people's lives healthier, safer and more fulfilling.

Olympus Corporation of the Americas (OCA)—a wholly owned subsidiary of Olympus Corporation in Tokyo, Japan—is headquartered in Center Valley, Pennsylvania and employs more than 5,000 employees throughout locations in North and South America. For more information, visit www.olympusamerica.com.

About ai4gi

ai4gi is a commercial joint venture between Satis Operations and Imagia. Satis is a medical consultancy founded to deliver cutting-edge solutions in the field of Gastroenterology, by bringing quality data, clinical direction, market opportunity insight, academic awareness and visibility, and global GI key-opinion leadership to the MedTech and Biotech industries. Imagia is an AI healthcare company developing the Evidens collaboration ecosystem to unite creative minds in AI and healthcare to power discovery at scale. Through Evidens, clinical insights from member hospitals are united with AI expertise from Imagia and its AI research partners. We partner with pharmaceutical companies and medical device manufacturers to commercialize clinical AI solutions to improve personalized outcomes for patients. With an initial focus on personalized oncology, our mission is to leverage advances in AI to reveal the full picture of personalized healthcare.

For more information, visit www.ai4gi.com and www.imagia.com

May 7th, 2018
News Release from Olympus America Inc. (OAI)

Olympus made a collaborative research agreement with ai4gi, a joint venture between Satis Operations and Imagia, specialized in clinical diagnosis support solution in colonoscopy using AI.



News Release: Announced on October 29th, 2018

OLYMPUS

NEWS RELEASE

October 29, 2018

Olympus to Acquire Equity Stake in LPixel
—Aims to enhance development of AI technologies to support endoscopic and microscopic diagnostic imaging—

Olympus Corporation announced today that it has agreed to subscribe to a third-party allotment from LPixel Inc., a venture company spun off by the University of Tokyo, based on which it has agreed to acquire equity stakes in LPixel.

1. Reasons for subscription to the third-party allotment

AI and the internet of things (IoT) are strategic focuses for Olympus, which has been striving for some time to develop medical and scientific products and services that incorporate these technologies. LPixel, which offers strengths in image-analysis software systems in life sciences, has been researching and developing technology for image-based diagnostic-support systems in the medical field. To date, the two companies have engaged in joint research to develop AI technologies for Olympus' endoscopic and microscopic diagnostic-imaging support systems.

While LPixel has been looking to raise capital via third-party allocations to accelerate software development and commercialization, Olympus appreciates LPixel's AI technology and its high affinity with Olympus' business domains, and determined that combining the two companies' extensive imaging data would support development of AI technologies for Olympus products. In conjunction with the capital injection via a third-party allotment, LPixel and Olympus will begin discussing a new cooperative framework, including for future business alliances.

2. About LPixel

LPixel has developed high-precision software by applying image-analysis technology, particularly AI technology, in life sciences fields including medicine, pharmaceuticals and agriculture. The company has been partnering with the University of Tokyo, the National Cancer Center of Japan and several other medical institutions, focusing on the research and development of medical image-based diagnostic-support systems supported with AI.

LPixel and Olympus look forward to their early introduction of AI-supported products and contributing to image-based diagnostic-support systems for the medical and scientific fields.

LPixel Inc., a venture company with its strength in image analysis software systems in the field of life science, started with research members from the University of Tokyo. The company has made efforts on research in medical imaging technology for diagnostic support, and a collaborative research with Olympus is currently underway on AI technology development to support medical diagnostic imaging of endoscopes/microscopes.



OLYMPUS NEWS RELEASE

Your Vision, Our Future September 19, 2017

Launch of ORBEYE Surgical Microscope with 4K 3D Capabilities Supporting Precision Surgery with High-Resolution Digital Images with Stereoscopic Visual Field
 Developed by Sony Olympus Medical Solutions Inc.

Olympus Corporation (President: Hiroyuki Sasa) today announced the launch of its ORBEYE Surgical Microscope, incorporating the latest advances in 4K 3D video technology, in Japan and America in early October 2017¹. The technology used in the new microscope was developed by Sony Olympus Medical Solutions Inc. (President: Yoichi Tsusue), a joint venture between Olympus Corporation and Sony Imaging Products & Solutions Inc. (President: Shigeki Ishizuka).

Surgical microscope is an apparatus to facilitate operating procedures involving fine nerves, blood vessels and other small anatomic features, by providing an enlarged stereoscopic visual field of the surgical site. The increasing prevalence of malignant tumors and other problematic conditions that have accompanied population aging over recent years has spurred growth in the use of such instruments, most of which have employed optical designs.

The 4K 3D digital images of the new ORBEYE microscope improve surgical accuracy as it provides high-resolution stereoscopic images of the fine structure of tissue and blood vessels. As the progress of surgical procedures is to be displayed on a large 55-inch monitor, it is expected to reduce surgeon fatigue of an operator by eliminating the need for extensive viewing via microscope eyepieces for an extended time. In addition, the digitization technology has made the new microscope unit approximately 95% smaller in volume² than the conventional model³, contributing to secure a larger surgical space and shorten setup times. The microscope unit was also made 50% lighter⁴ than the conventional model³ to facilitate its transportation between operating rooms. The technology adopted in the ORBEYE was developed by Sony Olympus Medical Solutions, and its product design was handled by Olympus Medical Systems Corp. The ORBEYE will be marketed by Olympus Corporation.

¹ The system will be progressively launched in other markets.
² OME-9000: 19,000cm³, ORBEYE: 820cm³ (figures are approximate)
³ OME-9000
⁴ OME-9000: 450kg, ORBEYE: 216kg

• **Launch Overview**

Name	Launch Date
ORBEYE Surgical Microscope System	Early October 2017

- **Main Features**
1. High-resolution 4K 3D digital images support precision surgery
 2. Use of 55-inch 4K 3D monitor contributes to a reduction of surgeon fatigue and facilitates team surgery
 3. Significant reduction in size (95% smaller than the conventional model) leading to secure a

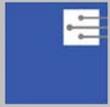
News Release: Announced on September 19th, 2017

Olympus Corporation (President: Hiroyuki Sasa) released an operating microscope ORBEYE with 4K and 3D video technology in the beginning of October, 2017, in Japan and U.S. Sony Olympus Medical Solutions Inc. (President: Yoichi Tsusue) was in charge of the technical development of this product. The company is the joint venture of Olympus Corporation and Sony Imaging Products & Solutions Inc. (President: Shigki Ishizuka) in the field of medical business.

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Assign the Responsibilities of Customer Solutions Development, Global

IMAGE
STREAM
MEDICAL



Customer Solutions Development, Global

Eddie Mitchell



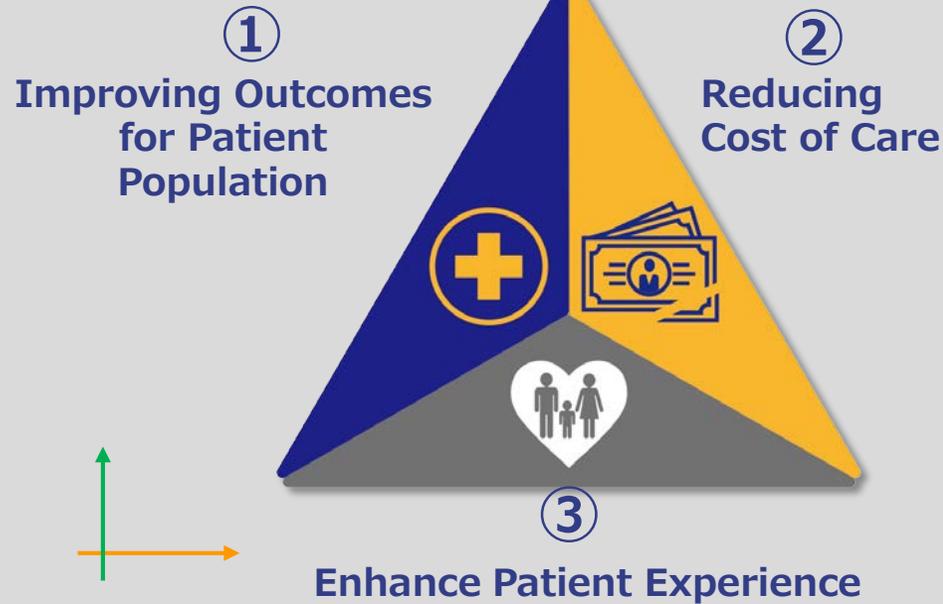
Customer Solutions Development, Global
Deputy Position

Mitsutoshi Aizawa
(相澤 光俊)



Creating Customer Value through Early Diagnosis and Minimally Invasive Treatment

Triple Aim



+ Added Value through ICT-AI Platform

Quadruple Aim



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