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Your Vision, Our Future

R&D Function Strategy

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16CSP

Today's Agenda

- 1. Current Conditions and Issues**
- 2. R&D and Manufacturing Strategy Framework**
- 3. Technology Development Function Enhancement Strategy**
- 4. Core Technology Management Strategy**
- 5. New Technology Acquisition (V-Model Development Process Strategy)**
- 6. Appropriate Resource Allocation (R&D Resource Shift)**

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1. Current Conditions and Issues

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

- Pursuit of customer value related to *early diagnosis* and *minimally invasive treatments*
 - Further evolve endoscope technologies and strengthen lineups of endoscope ET devices, therapeutic energy devices, etc.
 - 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 processes (utilize ICT, etc.)
- Shift from Japanese-style technology development to global R&D
 - Position as growth businesses treatment technologies of Medical Business and nondestructive testing technologies of Scientific Solutions Business

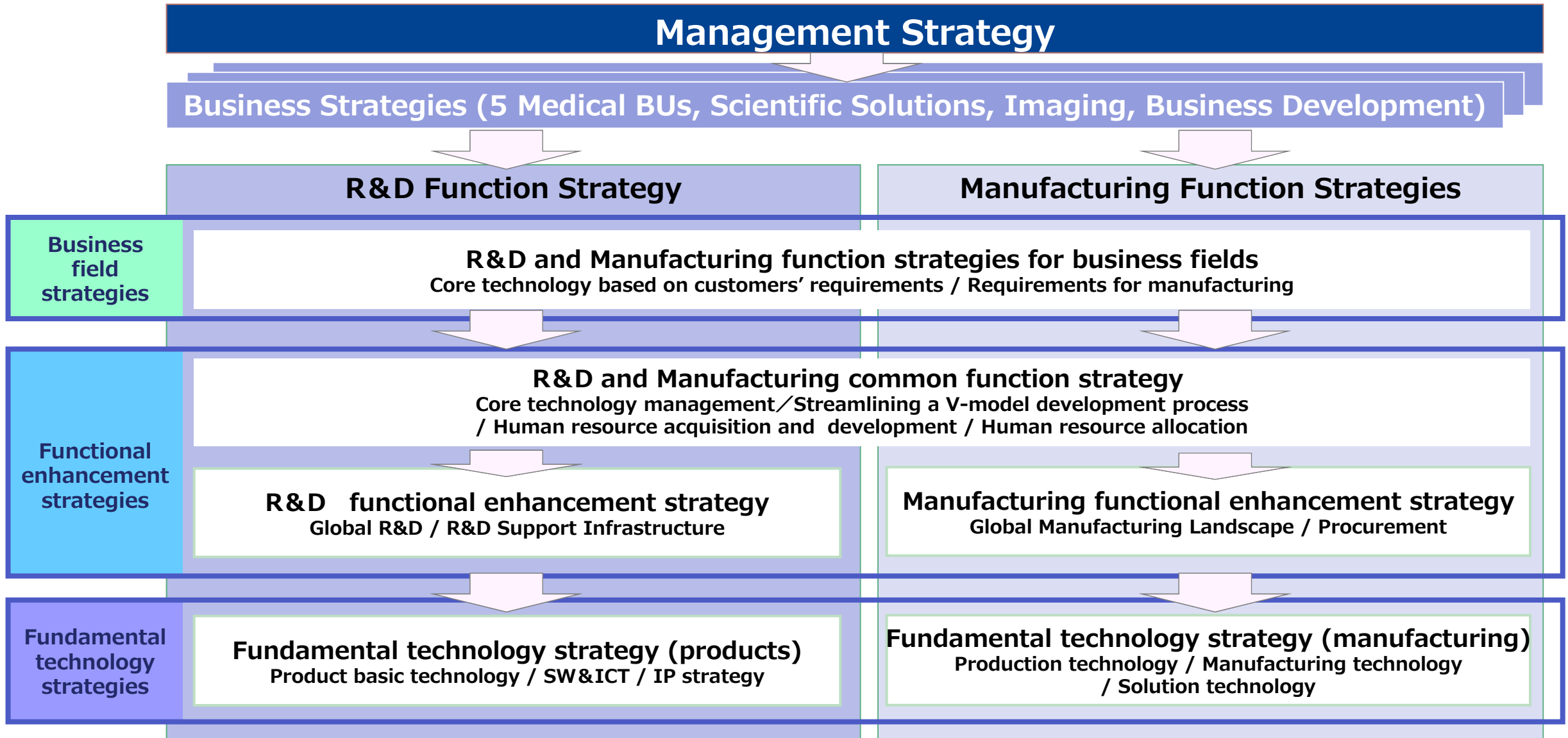
Shared: Improvement of development efficiency through cross-business application of technologies

- Utilization of 4K and 8K technologies, robotics technologies, deep learning, ICT, and other technology trends
 - Proactively apply advanced Imaging Business technologies to Medical Business and Scientific Solutions Business and form alliances with other companies

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2. R&D and Manufacturing Strategy Framework



2. R&D and Manufacturing Strategy Framework

Strategy framework		Relationship to management targets			
		Capital efficiency Development efficiency improvement	Profitability Cost of sales ratio reduction	Business growth Sales expansion	Business growth Preparations for new businesses
Business field technology development function strategies	Medical				
	Scientific Solutions		○	○	
	Imaging				
Functional enhancement strategies		○	○		
Fundamental technology strategies	Basic technology	○			○
	Production technology		○	○	○
	Manufacturing technology		○		
	Solutions technology	○			

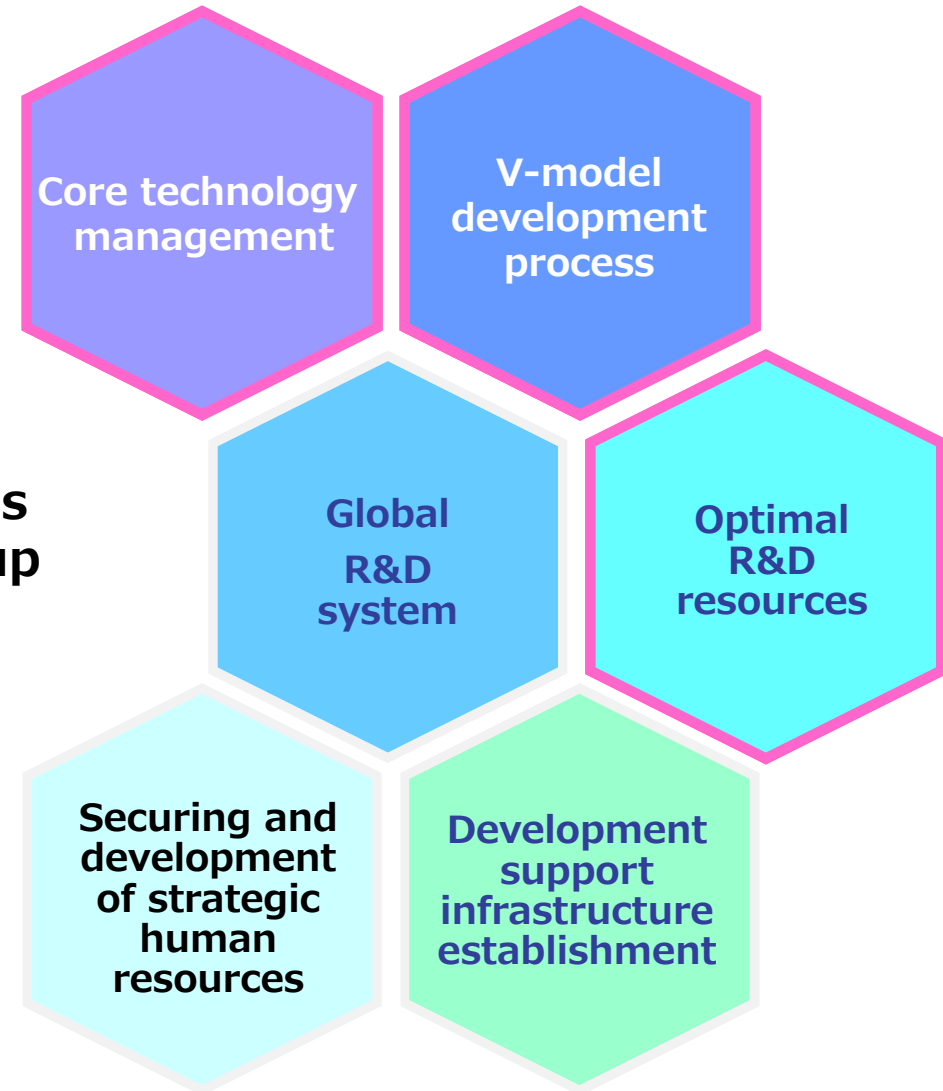
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3. Technology Development Function Enhancement Strategy



Strategies for enhancing R&D functions of R&D Group and Manufacturing Group



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4. Core Technology Management Strategy



I . Access technologies

II . Imaging and sensing technologies

III . Recognition and analysis technologies

IV . Treatment and therapeutic technologies

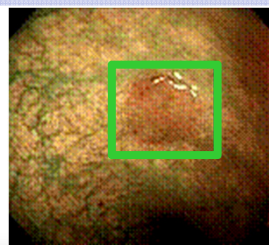
V . Report and evidence technologies



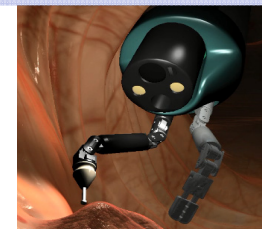
Optical Technologies



Electronic Imaging Technologies



OPTO-DIGITAL Technology



Precision Technologies



Biological Based Technologies

4. Core Technology Management Strategy : I. Access technologies

I. Access technologies:

Expand range of diagnosis, inspection, and imaging through usage of ultracompact actuators, etc.

Endoscopic diagnosis:

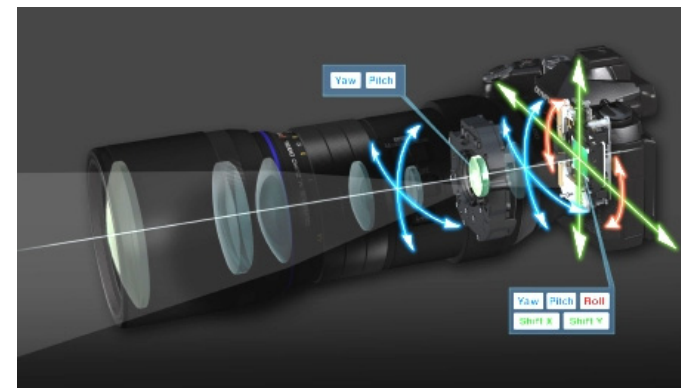
Expand range of diagnosis by further reducing diameter, improving bend operability, and employing motor-driven insertion technologies

Industrial videoscope inspection :

Expand range of inspections by evolving remote observation technologies

DSLR camera photography:

Expand range of photography with compact, lightweight design; dust/splash proof systems; high-speed autofocus; and powerful image stabilizers



4. Core Technology Management Strategy : II. Imaging and sensing technologies

II. Imaging and sensing technologies:

Strengthen diagnosis, examination, and imaging functions with 4K and 8K resolutions, 3D imaging, specific light spectra observation, live image retrieval, image merging, etc.

Endoscopic diagnosis and treatment:

Enhance ability to diagnose cancer with 4K images, image highlighted observation, and magnified endoscopic observation; enable visualization behind scope with ultrawide angle colonoscopes; and improve operability for localized endoscopic treatment with 3D images

Real-time live cell observation:

Decipher brain functions in regenerative medicine research with 4K images, live image retrieval, 3D observation, and special laser light observation

Application to photography under special conditions:

Enhance macro photographs with Focus Stacking, photograph starry nights with Live Composite, and take 4K and 8K videos



4. Core Technology Management Strategy : III. Recognition and analysis technologies

III. Recognition and analysis technologies:

Utilize deep learning to substantially improve image diagnosis and inspection and analysis capabilities

Improved lesion detection capabilities:

Support lesion detection and reduce false diagnosis rates by utilizing similar image analysis

Failure analysis through nondestructive testing :

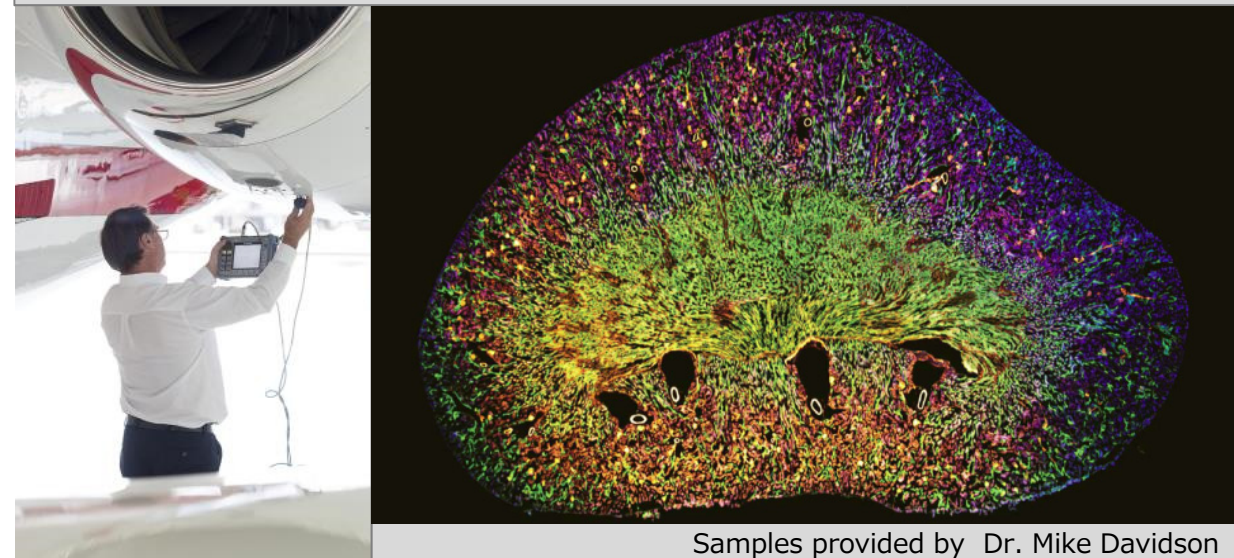
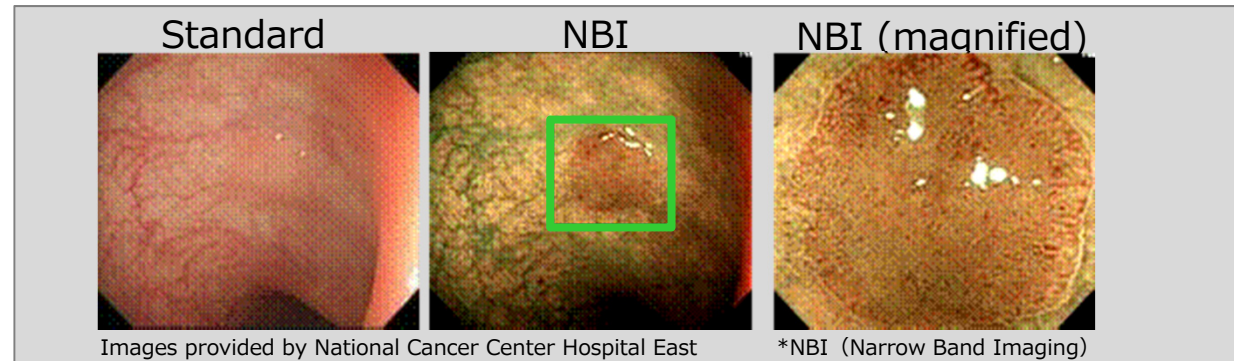
Predict failures and facilitate optimal maintenance by improving analysis capabilities

Defect analysis with industrial inspection equipment:

Classify defects by categorizing retrieved images

Drug discovery screening through cell observation:

Provide solutions with live cell observation and image analyses



4. Core Technology Management Strategy : IV. Treatment and therapeutic technologies

IV. Treatment and therapeutic technologies:

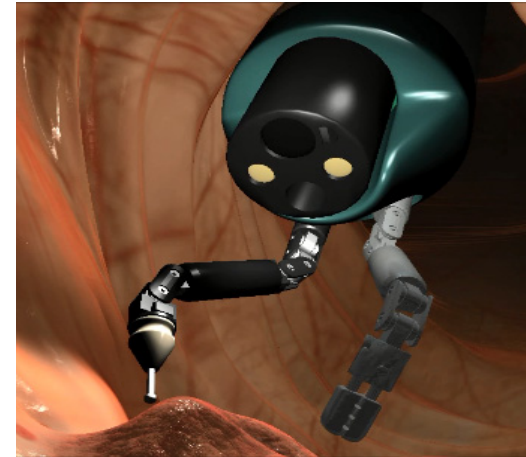
Reduce patient burden with localized treatments that utilize treatment, therapeutic, disposable device, robot, and energy device technologies in accordance with procedure based medical business model

Localized endoscopic treatment:

Expand disposable ET device lineup; increase value related to hemostasis, stone destruction, and other areas; and extend application to orthopedics

Surgical energy device treatment:

Expand application of THUNDERBEAT surgical energy device, reduce surgeon burden with surgery support robots, and develop energy devices for localized treatment in ENT and Urology / Gynecology fields



4. Core Technology Management Strategy : V. Report and evidence technologies

V. Report and evidence technologies:

Strengthen medical RA functions and utilize ICT to create business models

Diagnosis and treatment evidence:

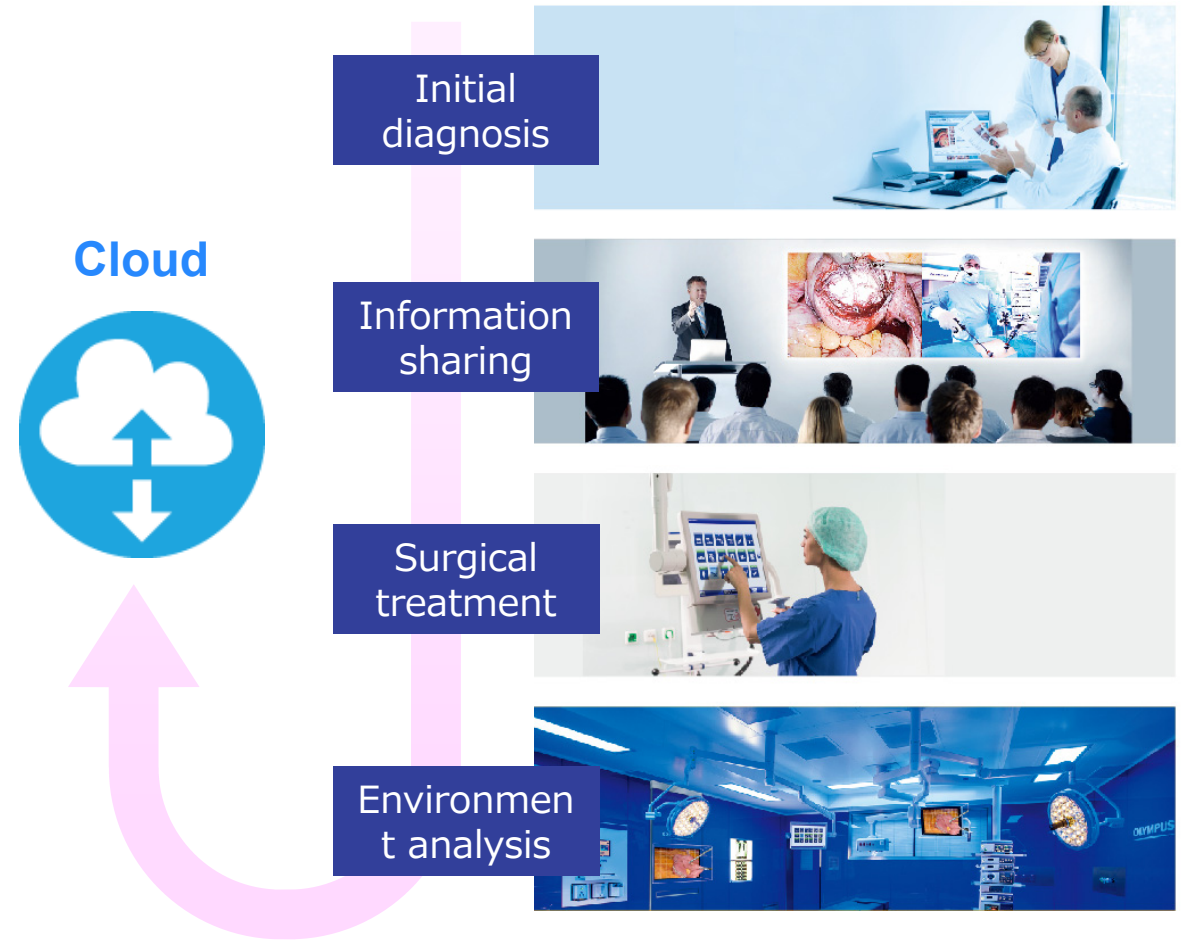
Address diagnosis and treatment guidelines by strengthening evidence acquisition systems and ensure safety and peace of mind

ICT for medical information:

Utilize endoscopic workflow information, support inspections (image records and cleaning history), and create procedure based medical business model

ICT for Scientific Solutions Business solutions:

Save large quantities of data, utilize data for maintenance, create reports, and realize operation via tablets



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5. New Technology Acquisition (V-Model Development Process Strategy)

Process for clarifying concept and feasibility (innovations)

R&D
Rapid POC

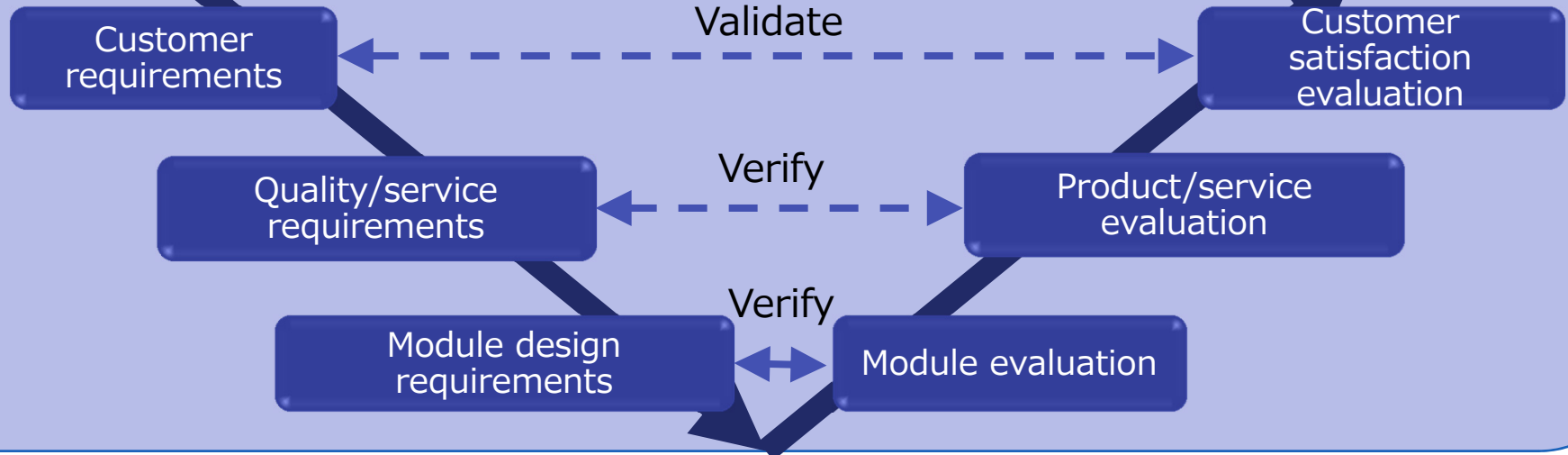
Creation of new business concepts
Identification of major technology issues
Rapid POC (Proof of Concept)

Core technology
development

Concurrent development encompassing production and
manufacturing technologies

Quality creation process

Quality verification process



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6. Appropriate Resource Allocation (R&D Resource Shift)

Establishment of matrix-style organization system that allows for flexible resource shifts

- Prior lack of inter-business resource shifts
 - Lacked ability to respond to rapid market contraction in Imaging Business
 - Recognized importance of shifting resources to growth businesses for realizing organic growth

Increased allocation of resources to treatment technologies and strengthening of global R&D

- Rectification of 6:4 diagnosis technology to treatment technology resource allocation ratio by increasing allocation of resources to treatment technologies
 - Strengthen R&D systems that focus on treatment technologies in Europe and U.S.
 - Enhance disposable device startup and manufacturing capabilities (low-cost mass production and automation)

Strengthening of RA capabilities

- Need for enhanced product registration capabilities to respond to product regulation changes in various countries
 - Shift from product development systems focused on new products to systems considering product life cycle management

6. Appropriate Resource Allocation (R&D Resource Shift)

Utilization of Imaging Business technologies in other businesses

- Advanced digital technologies
 - High-resolution displays and EVF devices
 - AF and IS technologies for 4K imaging

- Utilization in Scientific Solutions Business
 - Application of devices to scientific inspection equipment
 - Realization of 4K microscopes and industrial endoscopes

- Low-cost production and design capabilities
 - Low-cost mass production technologies
 - Composite part integration technologies

- Utilization in Medical Business
 - Mass production of disposable devices
 - Development of low-cost energy devices

- Mobile technologies
 - Energy-efficient designs (mobile batteries)
 - Wireless and cloud capabilities

- Utilization in Scientific Solutions Business and Medical Business
 - Development of mobile (compact) products
 - Storage of acquired data in cloud servers

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