Sensing Business

October 6, 2021

Hitoshi Kamezawa

Corporate Senior Vice President,

General Manager of Sensing Business Headquarters

Sensing Field: Business Overview

A high-added-value business, contributing diverse sensing solutions for customers pursuing the quality of light, color and imaging

The Standard in Measuring Color & Light

In addition to supporting "high-quality manufacturing", we will go beyond human vision to keep providing new customer value and solve global social issues, in the "safety, security and sanitation" field

Sensing Field: Business Overview – Business Field

Light source
color measurement

Measuring light & display: including increasingly advanced displays, light sources for facial recognition and lighting to support everyday life

- Display color adjustment and brightness uniformity inspection
- LED light evaluation and quality management
- Auto headlight inspection

Object color
measurement

Measuring color and appearance : exterior colors of industrial products, quality differences and characteristics by color

- Color management for auto parts
- Grading by product color for foods
- Color management for printing (integrated into production printers)

Visual inspection

Ensuring the quality and function of appearance: highly-designed cars and industrial product surfaces

- Inspection of exterior damage
- Inspection of auto exteriors for gaps and unevenness
- Inspection of fuel cells and other parts for defects

HSI*
measurement

Going beyond human vision: detailed image analysis capability, identification the contamination and the distribution of invisible substances
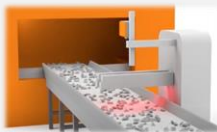
- Garbage sorting for the recycling industry
- Element analysis and foreign matter inspection for foods
- Pharmaceutical formulation analysis

*HSI: Hyperspectral imaging (technology used to visualize information across multiple wavelengths)

Sensing Field: Business Overview – Revenue

FY2020
Revenue +17% YoY

- Light source color: Demand from major display customers grew significantly
- Object color: Market continued to recover from the COVID-19 outbreak
- Visual inspection: Captured multiple new orders for measurement systems from major auto makers
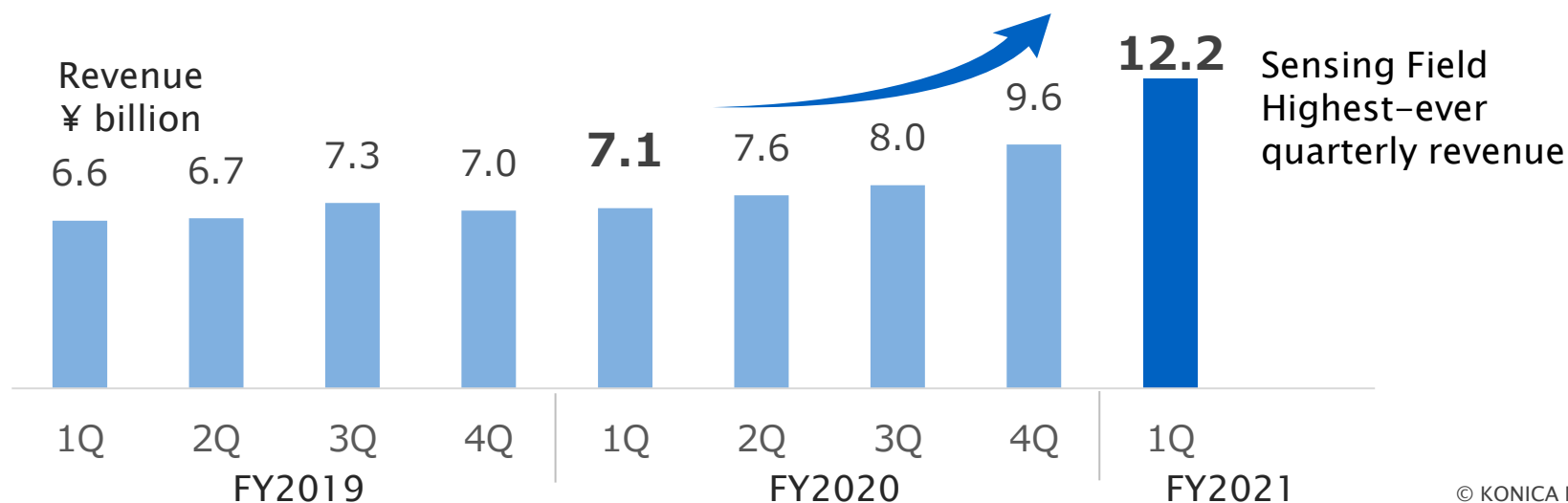- HSI: Consolidated Specim

¥32.3bn

Visual

HSI/Other

Object color

Light source
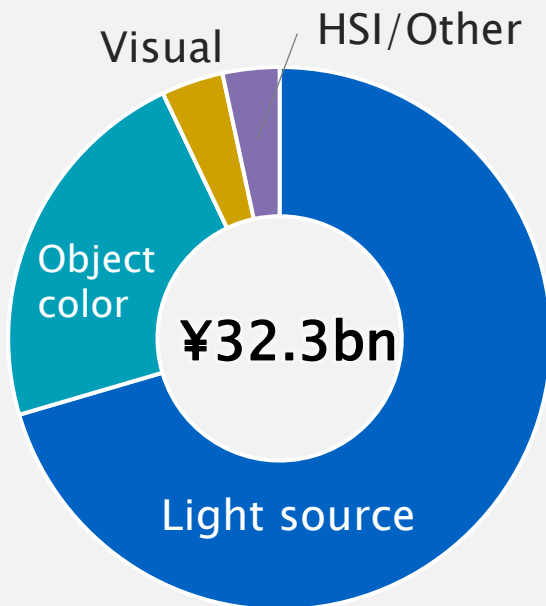
Note: Only three months of revenue is shown for HSI

Q1 FY2021
Revenue +72% YoY

- Demand increased for ICT devices; wider scope of applications
- China and Europe performed strongly; North America recovered
- Revenue was boosted by orders received in the previous fiscal year
- Effect of consolidating Specim

Revenue
¥ billion

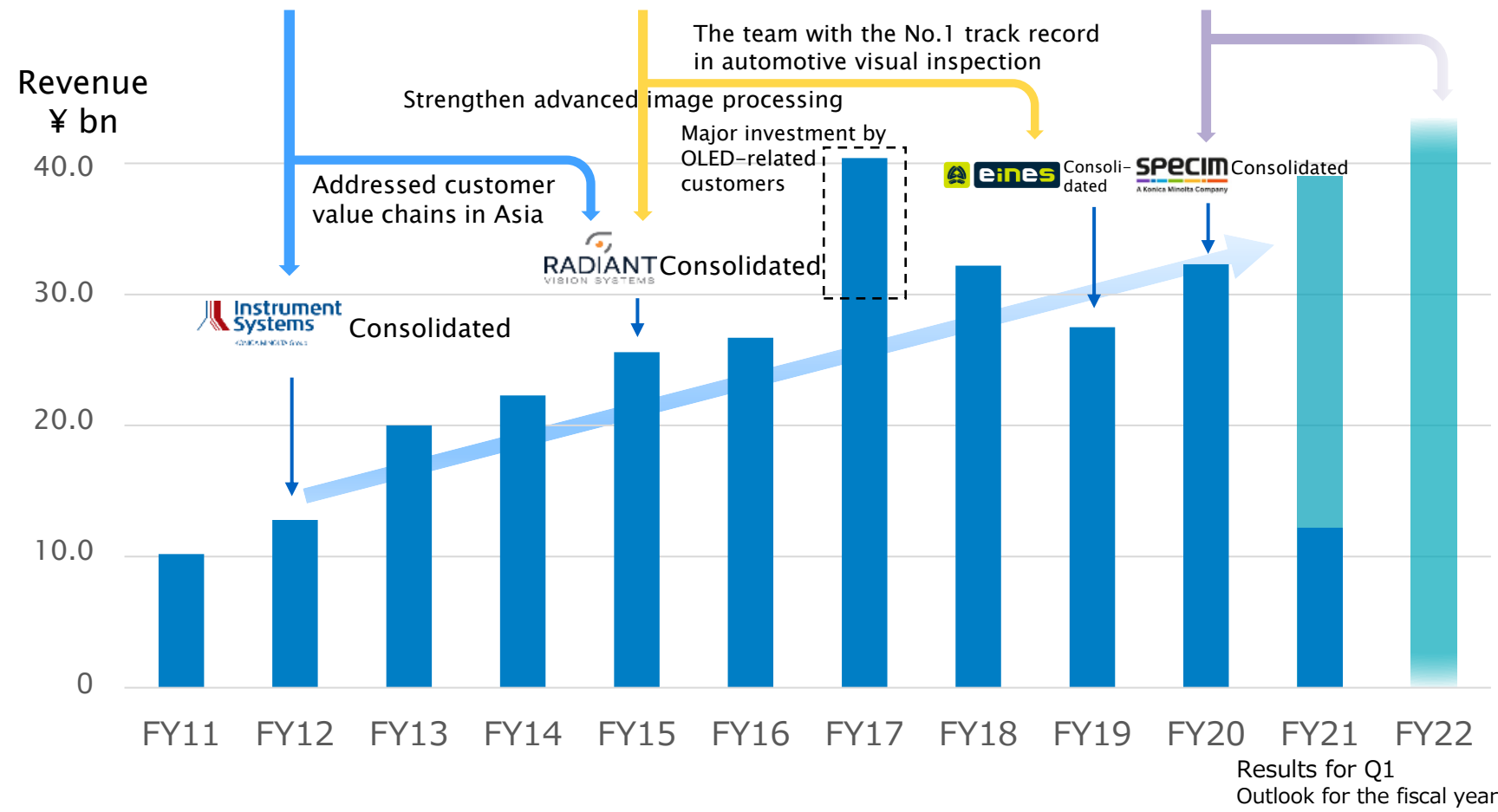| 1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q
6.6	6.7	7.3	7.0	**7.1**	7.6	8.0	9.6	**12.2**
FY2019				FY2020				FY2021

12.2 Sensing Field Highest-ever quarterly revenue

Growth through customers' value chain assets and a genre-top strategy*
Identify high-profit, high-growth markets, and coordinate between group companies to build a portfolio
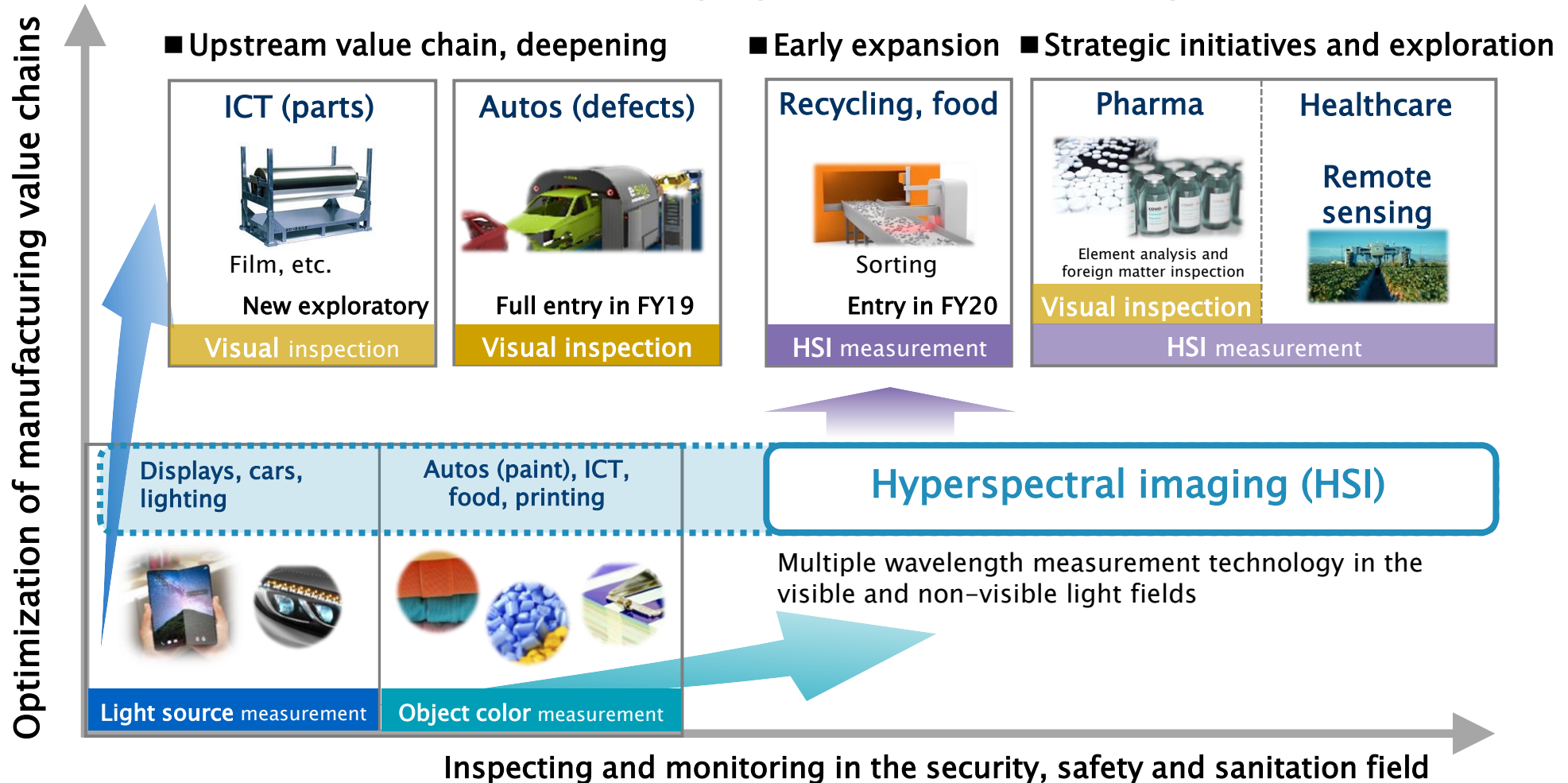
● Light source genre-top strategy ● Expand into visual inspection business ● Into the safety, security and sanitation field

The team with the No.1 track record in automotive visual inspection

Strengthen advanced image processing

Major investment by OLED-related customers

Addressed customer value chains in Asia

Revenue
¥ bn

40.0

30.0

20.0

10.0

0

RADIANT VISION SYSTEMS Consolidated

Instrument Systems Consolidated

eines Consolidated

specim Consolidated
A Konica Minolta Company

FY11 FY12 FY13 FY14 FY15 FY16 FY17 FY18 FY19 FY20 FY21 FY22

Results for Q1
Outlook for the fiscal year

*Genre-top strategy: Identify fields where growth is forecast and we can excel, focus our resources, and aim for the top position

Sensing Field: Growth Strategy

Accelerate optimization of value chain by utilizing visual inspection and color measurement data, and enter the safety, security and sanitation field with hyperspectral imaging as the core technology

Optimization of manufacturing value chains →

■ Upstream value chain, deepening   ■ Early expansion   ■ Strategic initiatives and exploration

ICT (parts)	Autos (defects)	Recycling, food	Pharma	Healthcare
Film, etc.		Sorting	Element analysis and foreign matter inspection	Remote sensing
New exploratory	Full entry in FY19	Entry in FY20		
Visual inspection	Visual inspection	HSI measurement	Visual inspection	HSI measurement

Displays, cars, lighting	Autos (paint), ICT, food, printing

Hyperspectral imaging (HSI)

Multiple wavelength measurement technology in the visible and non-visible light fields

Light source measurement	Object color measurement

Inspecting and monitoring in the security, safety and sanitation field →

Sensing Field: Projected Market Scale

Factors behind increase in demand for our measuring instruments

Particularly in society during and after the COVID-19 outbreak

- Demand for ICT devices has increased,
- Applications for display products have increased,
- There has been a trend toward automation and labor-saving

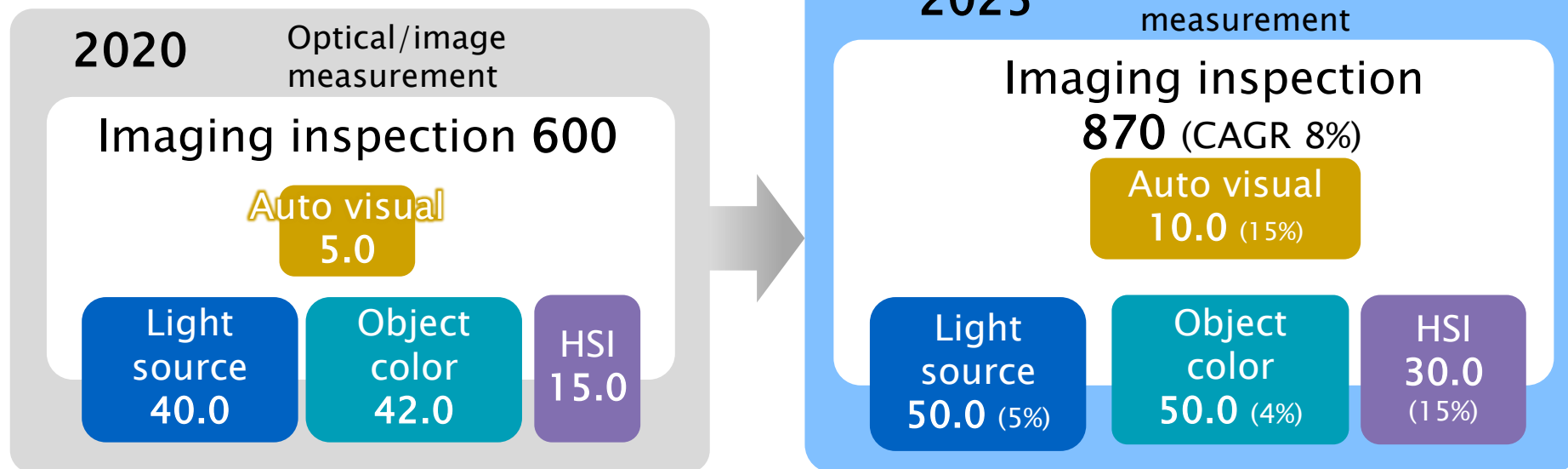**New inspection needs are emerging due to new materials and new technologies**

Medium- to long-term factors

Promote ESG (environmental, social and governance) factors

- Response to energy saving and renewable energy; electric vehicles
- Effective use of resources; recycling
- Investment in safety, security and sanitation field
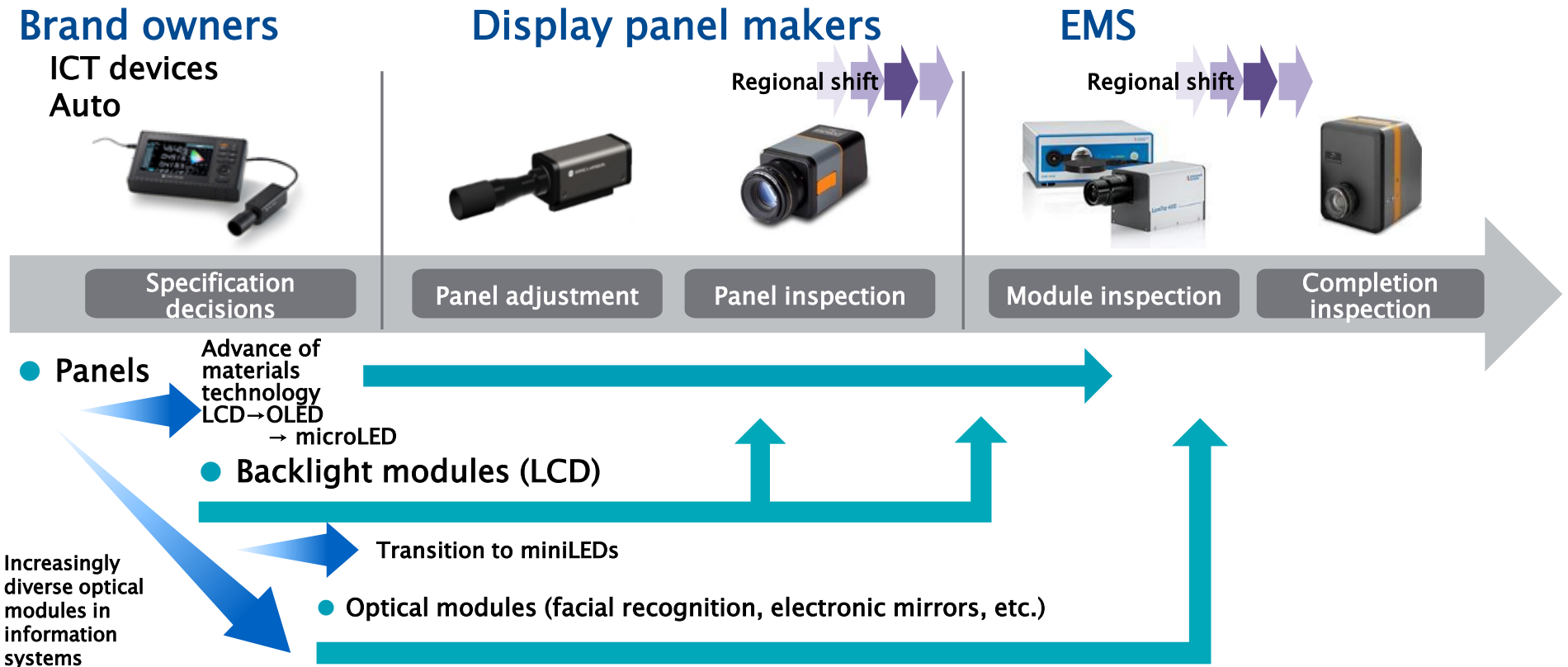
Enhance quality of life

Projected market scale*1 [¥bn] (CAGR %)

2020 — Optical/image measurement

Imaging inspection 600

Auto visual 5.0

| Light source 40.0 | Object color 42.0 | HSI 15.0 |

2025 — Optical/image measurement

Imaging inspection 870 (CAGR 8%)

Auto visual 10.0 (15%)

| Light source 50.0 (5%) | Object color 50.0 (4%) | HSI 30.0 (15%) |

*1 Scale of market as estimated by Konica Minolta; excluding printing

Sensing Field: Market Opportunities in Display Optical Measurement

Be the genre-top in light, color and imaging measurement / inspection for value chains, strengthen customer touch points, and further capture expanding applications in the relevant field
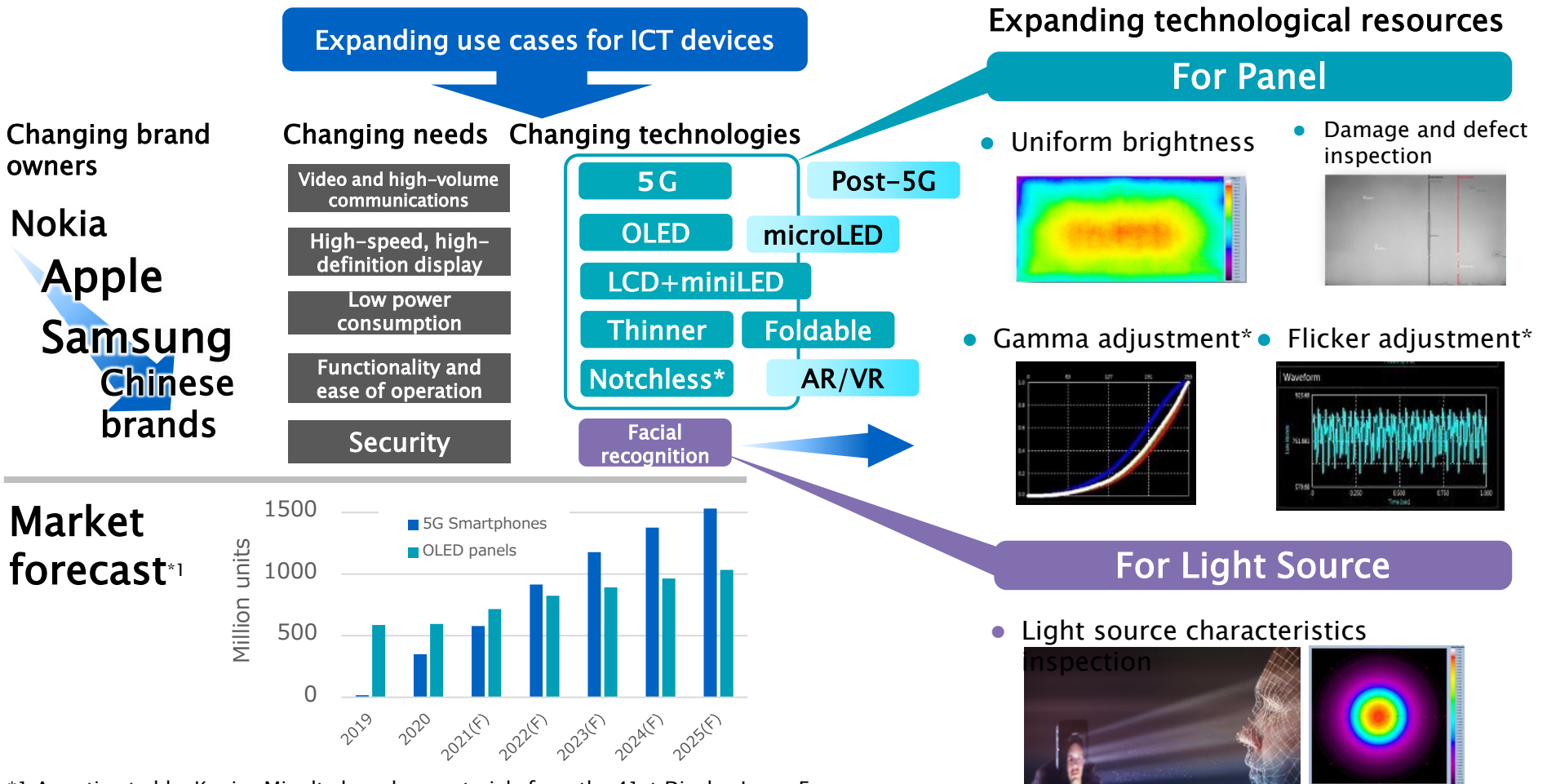
Brand owners
ICT devices
Auto

Display panel makers

Regional shift

EMS

Regional shift

| Specification decisions | Panel adjustment | Panel inspection | Module inspection | Completion inspection |

● **Panels**

Advance of materials technology
LCD→OLED
→ microLED

● **Backlight modules (LCD)**

Increasingly diverse optical modules in information systems

Transition to miniLEDs

● Optical modules (facial recognition, electronic mirrors, etc.)

60% global share in display optical measurement*1 – providing indispensable solutions

*1 As estimated by Konica Minolta

Sensing Field: Market Opportunities in Display Optical Measurement

Technological resources will expand through the provision of solutions in response to changing needs for ICT devices and changing customer technologies, and contribute to creating new entry barriers.

Expanding use cases for ICT devices

Expanding technological resources

For Panel

Changing brand owners

Nokia
Apple
Samsung
Chinese brands

Changing needs

Video and high-volume communications
High-speed, high-definition display
Low power consumption
Functionality and ease of operation
Security

Changing technologies

5G   Post-5G

OLED   microLED

LCD+miniLED

Thinner   Foldable

Notchless*   AR/VR

Facial recognition

- Uniform brightness
- Damage and defect inspection
- Gamma adjustment*
- Flicker adjustment*

For Light Source

- Light source characteristics inspection

Market forecast*1

Legend:
- 5G Smartphones
- OLED panels

Y-axis: Million units (0, 500, 1000, 1500)
X-axis: 2019, 2020, 2021(F), 2022(F), 2023(F), 2024(F), 2025(F)

*1 As estimated by Konica Minolta based on materials from the 41st Display Japan Forum
*Notchless: Increased display size through methods such as positioning the camera at the bottom of the display
*Gamma adjustment: Non-linear adjustment to the input/output relationship for human perception of brightness and color
*Flicker adjustment: Adjustment to prevent screen flickering

Sensing Field: Market Opportunities in the Object Color Measurement Field

Quality management applications in a variety of different markets, including autos, ICT and chemicals
Quantification (digitalization) of subtle color differences that are indistinguishable through human eyes or experience
Contribute to DX of increasingly global supply chains

Visualizing color differences

Contributing to product quality management

- Auto exteriors and interiors

- ICT appearance

- Color inconsistencies in processed foods

- Pharmaceuticals/ cosmetics

Color creation

Helping customers build product quality

- Optimal paint and resin recipe

- Printer color adjustment

Continuing to provide value through advanced knowledge of color and light, and a stable customer base

Sensing Field: Market Opportunities in the Auto Field

We will expand our businesses through enhanced solutions for creating environmentally friendly vehicles, issues of color and light due to new materials and technological progress, and issues faced by the supply chain in society during and after COVID-19.
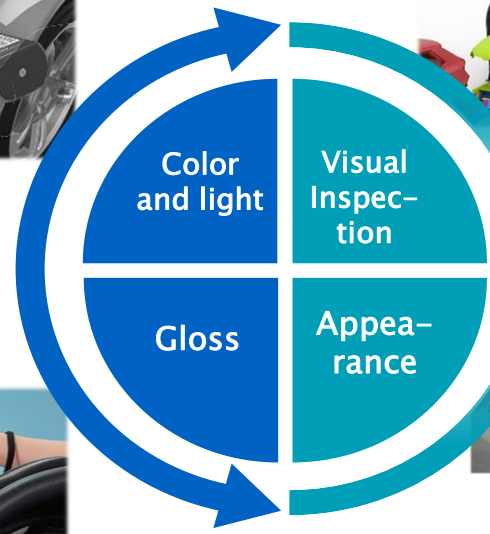
New

- Expand sales of systems for simultaneous measurement of colors and gloss suitable for material and parts management at multiple sites

CM-36dG

Core business fields

| Color and light | Visual Inspection |
| Gloss | Appearance |

Expand

Materials and paints | Molded products | **Assembly** | Body

Globalization

Shift to carbon neutral and electrification

Sensing Field: Strategic Expansion into the Visual Inspection Field

Promote genre-top strategy by enhancing technology and customer assets through company acquisition
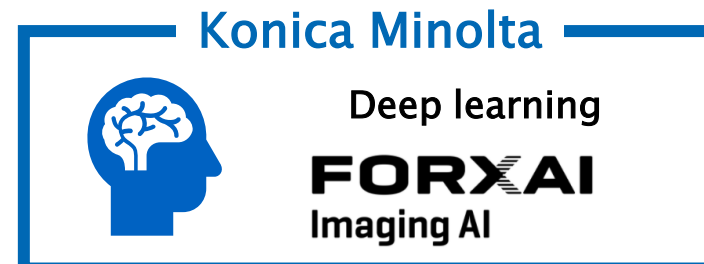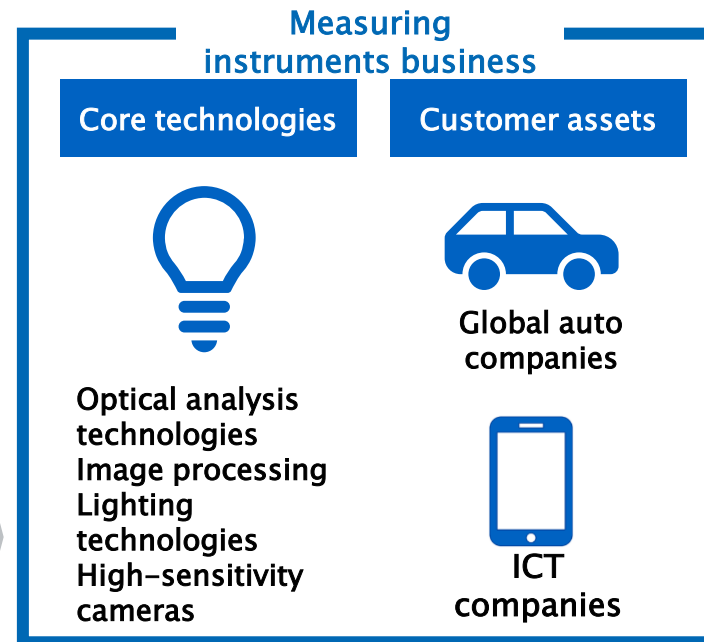
Current status

Visual defect inspections relying on the human eye

Strong demand for quality inspection automation

Stable quality management
Enhanced productivity and efficiency
Improvements in the labor environment

Measuring instruments business

Core technologies

Optical analysis technologies
Image processing
Lighting technologies
High-sensitivity cameras

Customer assets

Global auto companies

ICT companies

+

Konica Minolta

Deep learning

**FORXAI
Imaging AI**

Vision

Provide fully automated visual inspection system

Sensing Field: Progress of Business in the Visual Inspection Field

Expanding visual inspection from European to Asian and American automakers through group collaboration, and expanding applications from paint defect inspection to flush and gap, and auto parts inspection

Major EV makers

Gaps and unevenness inspections

Paint defect inspection

Fuel cell parts inspection

Some of our customers : Ford, Volkswagen, Major EV maker (U.S.), etc.

Major Auto maker (Japan), etc.

Sensing Field: Strategic Expansion into the HSI Field

Work with equipment manufacturers to expand business into recycling and food sorting applications

Current status and challenges

Environmental issues
- Serious garbage problem
- Effective use of resources

Strong demand to establish a recycling economy

Automatic sorting and labor-savings
Advanced recycling
Improvements in the labor environment

Measuring instruments business

Customer assets

Automotive and consumer electronics companies

Core technologies

HSI technology
Optical technology
Data processing

SPECIM
A Konica Minolta Company

Partners

Customer assets

Food companies
Recyclers

Core technologies

Sorting technology
Systems

Konica Minolta

Deep learning

FORXAI
Imaging AI
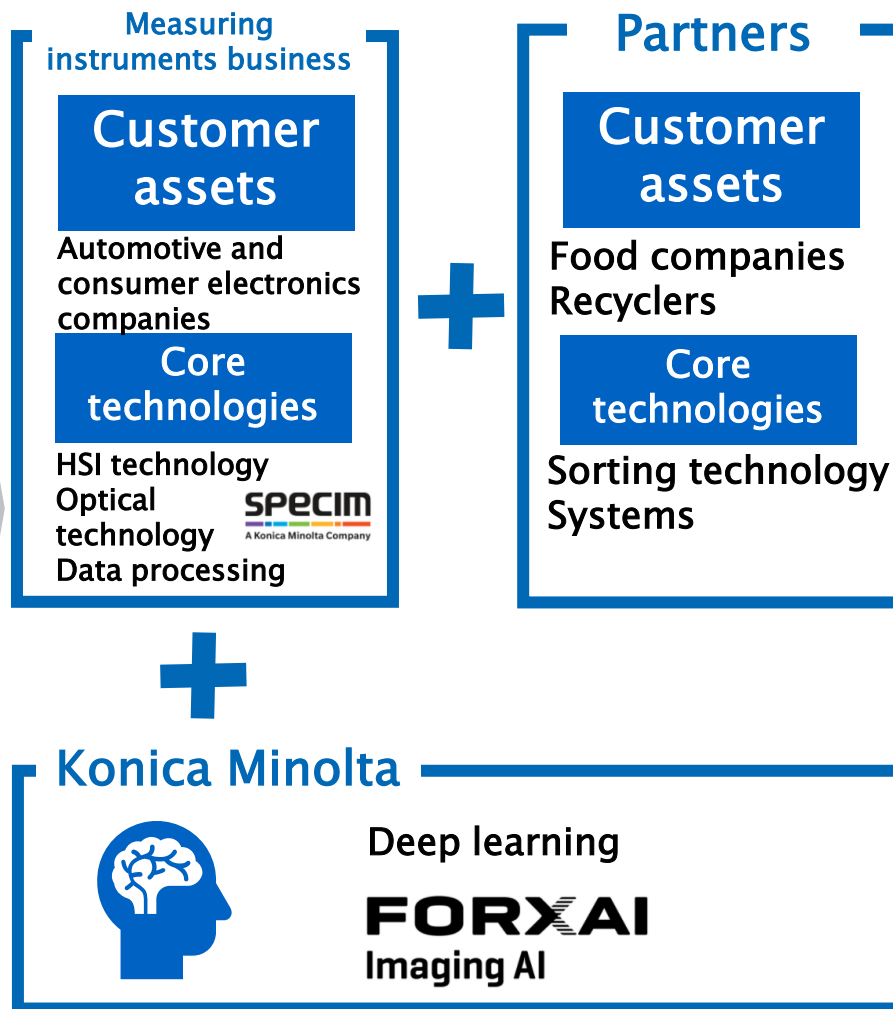
Vision

Safety, security and sanitation
Resolving social issues

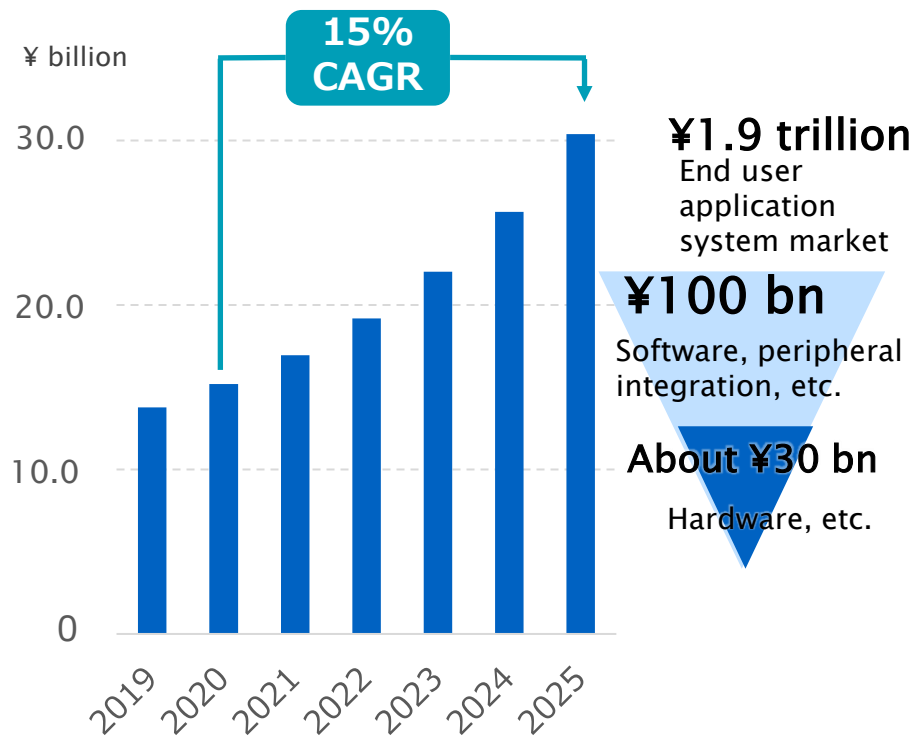Provide high-precision, high-purity sorting systems

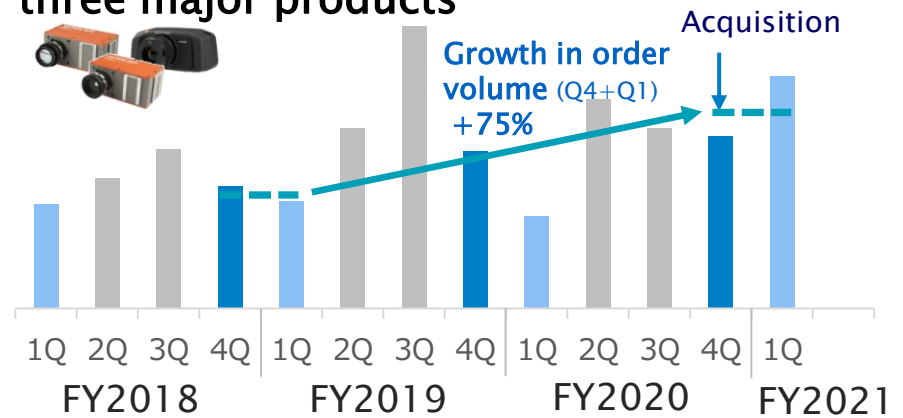# Sensing Field: Strategic Expansion into the HSI Field

We are growing smoothly through industrial applications, and aim to expand into surrounding markets by shortening the time to implementation through the introduction of the SpecimONE high-speed data processing platform.
We are also developing new applications in response to requests from numerous color and light measurement customers

HSI market forecasts*1

¥ billion

15% CAGR

30.0

20.0

10.0

0

2019 2020 2021 2022 2023 2024 2025

¥1.9 trillion
End user application system market

¥100 bn
Software, peripheral integration, etc.

About ¥30 bn
Hardware, etc.

● **Trend in volume of orders received for three major products**

Acquisition

Growth in order volume (Q4+Q1) +75%

1Q 2Q 3Q 4Q | 1Q 2Q 3Q 4Q | 1Q 2Q 3Q 4Q | 1Q
FY2018   FY2019   FY2020   FY2021

・Progressive integration into sorting systems

● **SpecimONE platform**

SPECIM INSIGHT
SPECIM CUBE
SPECIM FX SERIES

SPECIM ONE

・Achieve simple classification model construction and systemization

15

Example of introduction in recycling sorters

https://www.youtube.com/watch?v=9dbMWY76Pe8

Sensing Field: Growth Strategy

Expand visual inspection applications, targeting fields in which differentiation is possible

Apply to new devices in the ICT and automotive field through our newly acquired HSI technology, and aim strategically for pharma-related growth markets

Strategic business	**Visual**	Tens of billions of yen or more	8~15%	Components	Housings	Parts	Exteriors		
				Expanded applications				
	HSI	¥30 billion or more	15%		New devices			Recycling / Expanded applications
Core business	**Color and light**	¥100bn	CAGR 4~5%	Light sources	Housings	Light sources	Exteriors and interiors	Tablets and liquid medicines	Food
Measurement market scale*1				**ICT**		**Automotive**		**Pharma**	...
End user market scale*2				¥300–400 trillion		¥400 trillion		¥180 trillion	...

Strengthen

*1 Visual inspection for 2025 including auto and other fields, as estimated by Konica Minolta
*2 Summary estimated by Konica Minolta, including software, services, etc.

Sensing Field: Scale of Growth and Drivers

Both core and strategic businesses are progressing according to plan (Medium-term Business Plan DX2022), and the expansion of applications by our global team in the visual inspection and HSI fields is essential, in order to achieve FY2022 targets.
In addition, we will actively consider partnerships aimed at expansion in ESG-related and other fields

## Measures to achieve 2022 goals

Deepen core businesses

- Prepare new applications for devices for displays during H2 FY2021
- Ensure that we capture the expansion of customer value chains in India and other parts of Asia

**Expand on existing acquisitions in strategic investment fields***

- Expansion of HSI and its application areas through our sales network
- Expand regions and applications for visual inspection business (film, pharma, etc.)

Further increase in scale

Strategic investment

- Strategic alliances in the safety and security field
- Alliance in auto/ICT new parts inspection

¥32.3bn

¥39bn (forecast)

Strategic business

Core business

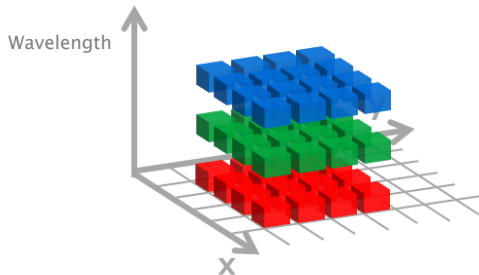| 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
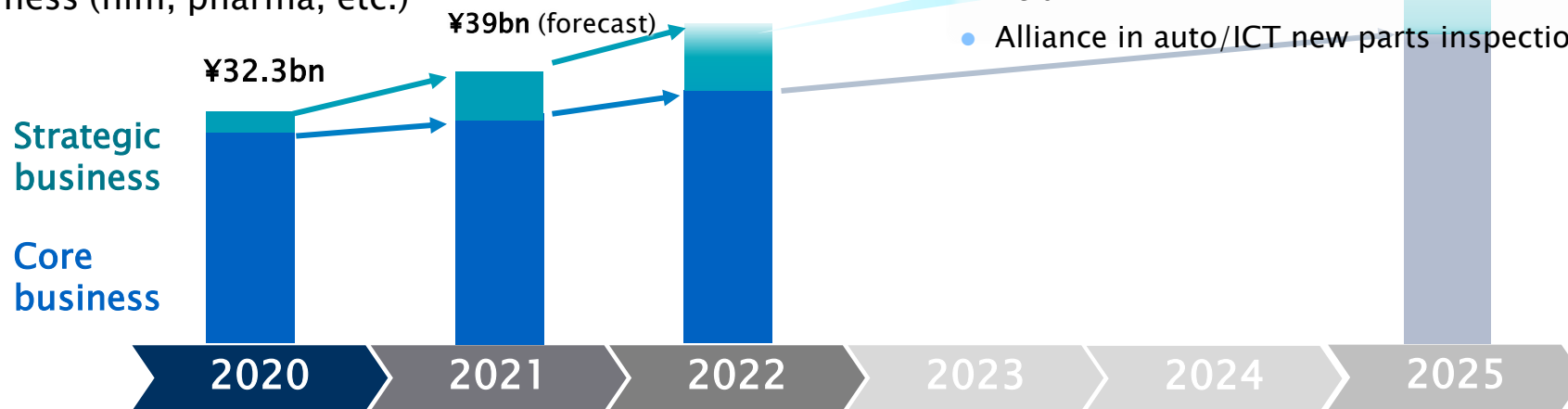
*Strategic investment fields: visual inspection, HSI applications
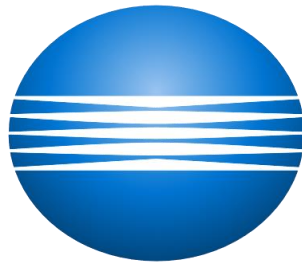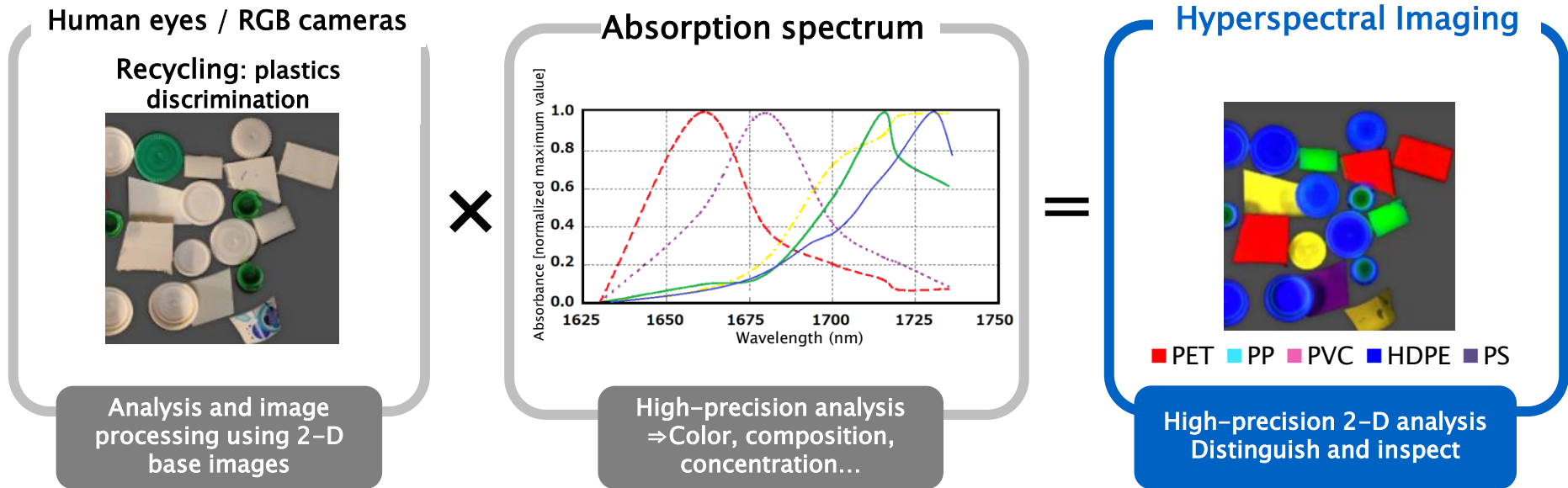
Appendix　Sensing Field: HSI Technology

Whereas human eyes perceive the colors of visual light in terms of three bands – red, green and blue – HSI perceives a wide range of wavelengths by splitting them into dozens or hundreds of bands, thereby enabling it to distinguish and inspect colors with a precision beyond human vision

*Illustration of HSI processing

Human eyes / RGB cameras

Recycling: plastics discrimination

×

Absorption spectrum

Absorbance [normalized maximum value]

1.0
0.8
0.6
0.4
0.2
0.0

1625　1650　1675　1700　1725　1750

Wavelength (nm)

=

Hyperspectral Imaging

■ PET　■ PP　■ PVC　■ HDPE　■ PS

Analysis and image processing using 2–D base images

High–precision analysis ⇒Color, composition, concentration…

High–precision 2–D analysis Distinguish and inspect

Wavelength

x

Wavelength

Dozens or hundreds of bands

y

x

Pixel count: Six times a 4K camera (8 million pixels)
Spectrum breakdown: Maximum 2688 bits
Reference TrueColor: 24 bits
Raw data: 48 bits