

February 22, 2022

2022 Analytical & Measuring Instruments Business Presentation Materials

Shimadzu Corporation

**Yoshiaki Mase, Senior Managing Executive Officer
and Analytical & Measuring Instruments Division
General Manager**

Introduction of Today's Speakers



Yoshiaki Mase (photo)

- Senior Managing Executive Officer and Analytical & Measuring Instruments Division General Manager
- Appointed General Manager of the Analytical & Measuring Instruments Division in April 2021, after serving as the China Regional General Manager

Shunei Matoba

- Corporate Officer and Deputy General Manager of the Analytical & Measuring Instruments Division (in charge of sales, international operations, and service)

Masami Tomita

- Corporate Officer, Deputy General Manager of the Analytical & Measuring Instruments Division (in charge of development and manufacturing), and General Manager of the R&D Department

Contents 1/2

I. Overview of Analytical & Measuring Instruments Business

1) Sales Trend	p. 6
2) Breakdown of Net Sales	p. 7
3) Product Portfolio	p. 8
4) New Products	p. 9

II. Growth Strategies for Analytical & Measuring Instruments Business

1) Growth Strategies and their Deployment	p. 11
2) DX Model	p. 12
3) Measures in Core Fields	
Analytical Instrument Market Growth and Shimadzu Business	
Deployment	p. 14
Pharmaceuticals	p. 15
Analysis Automation Systems	p. 18
Cellular Analysis Solutions	p. 19
Clinical	p. 20

Contents 2/2

II. Growth Strategies for Analytical & Measuring Instruments Business (continued)

Carbon Neutrality.....	p. 24
Materials.....	p. 25
4) Measures in the U.S., EU, China, and Asia	p. 27

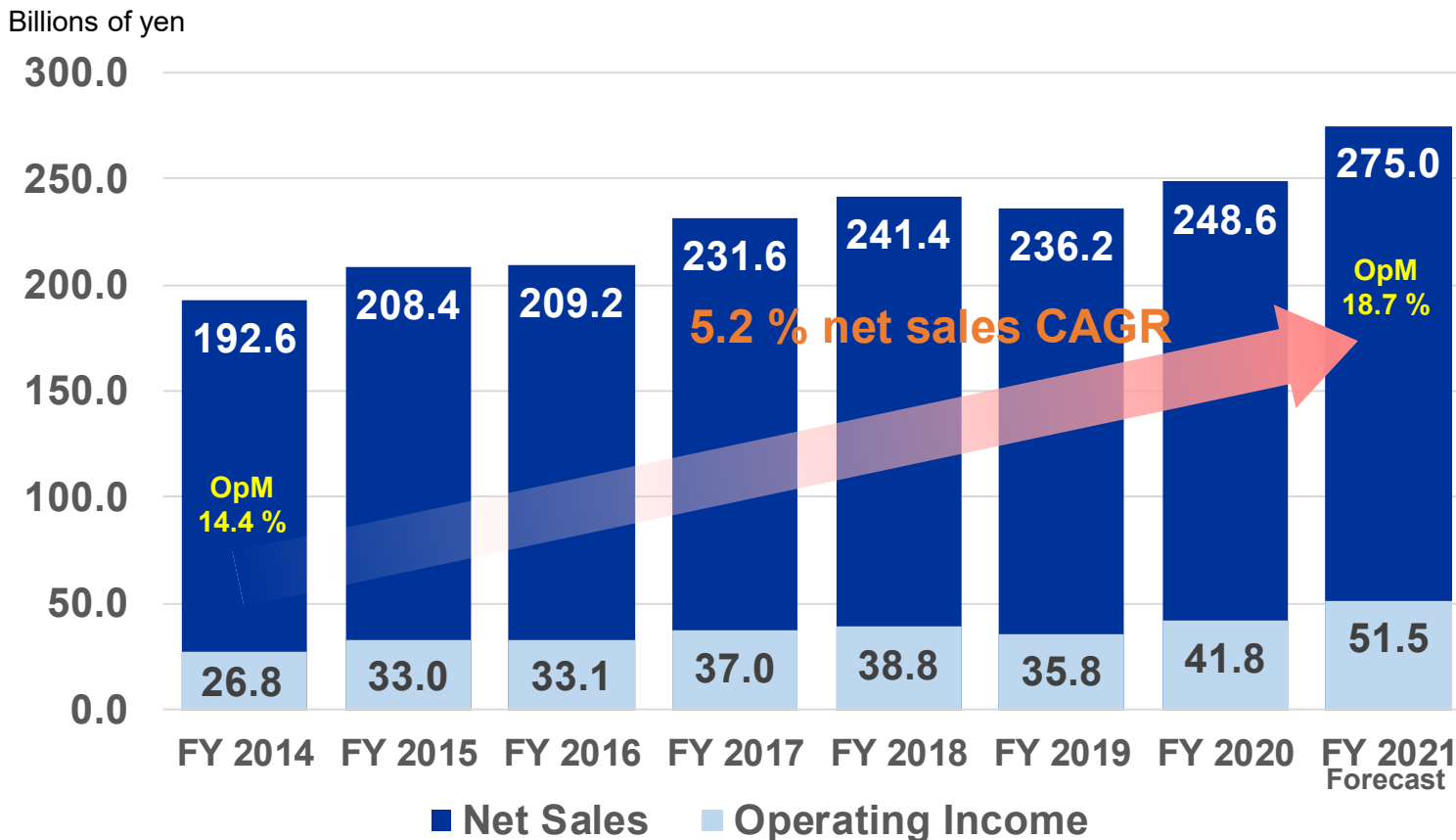
III. R&D Strategies for Analytical & Measuring Instruments Business

1) Global R&D Organizations.....	p. 30
2) Basic Technology Research Locations	p. 31
3) Product/Service Development Locations.....	p. 32
4) Application Development Locations	p. 33
5) Collaborations	p. 34

I. Overview of Analytical & Measuring Instruments Business

1) Sales Trend

From FY 2014 to FY 2021 (forecast), the CAGR of sales increased to 5.2 %, which is higher than the 4.5 % analytical instruments market average. In addition, driven by sales of more profitable key models (LC, MS, and GC), the operating margin for analytical and measuring instruments is expected to increase significantly, by 4.3 %, to 18.7 %.



Net Sales and Sales Ratio of Key Models (LC, MS, and GC)

Units: Billions of yen	FY 2014	FY 2020	Yen Increase
Key Models	97.7	135.6	37.9
Analytical & Measuring Instruments	192.6	248.6	56.0
Sales Ratio of Key Models	51 %	55 %	4 % increase



Nexera Series
Liquid Chromatograph
(LC)



LCMS-8060NX
Liquid Chromatograph
Mass Spectrometer (MS)

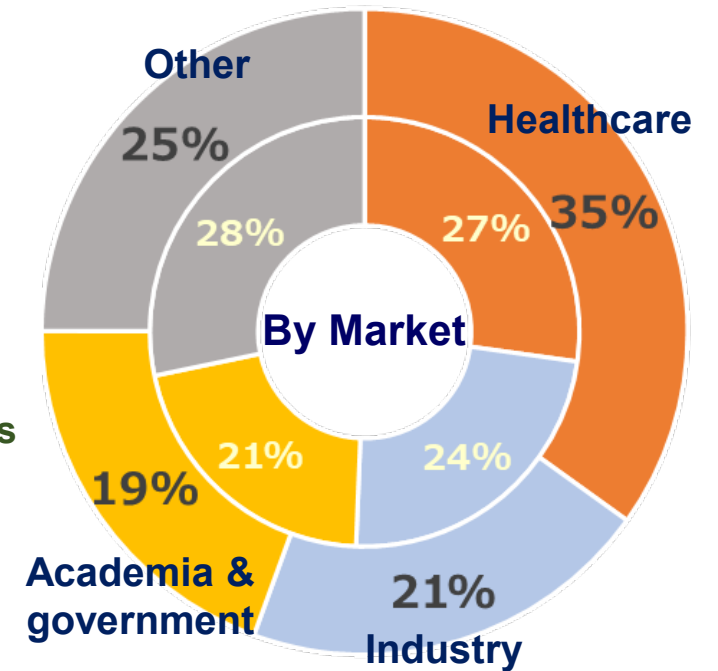
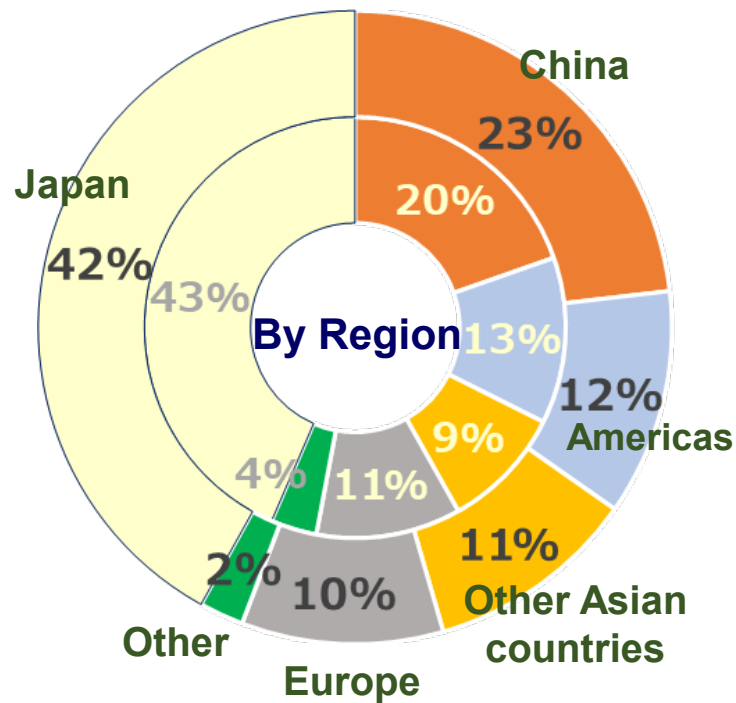
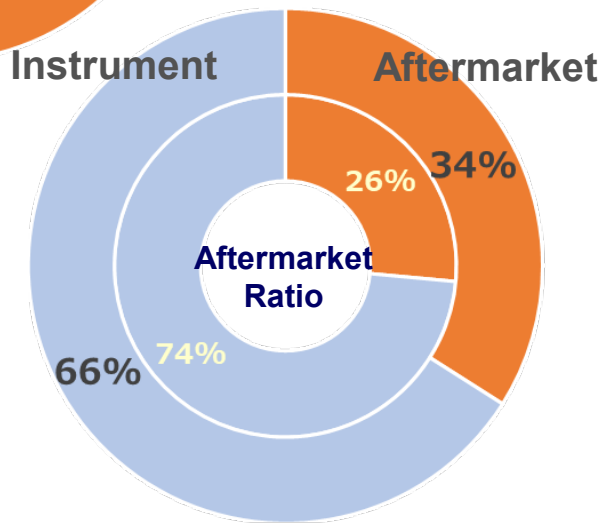
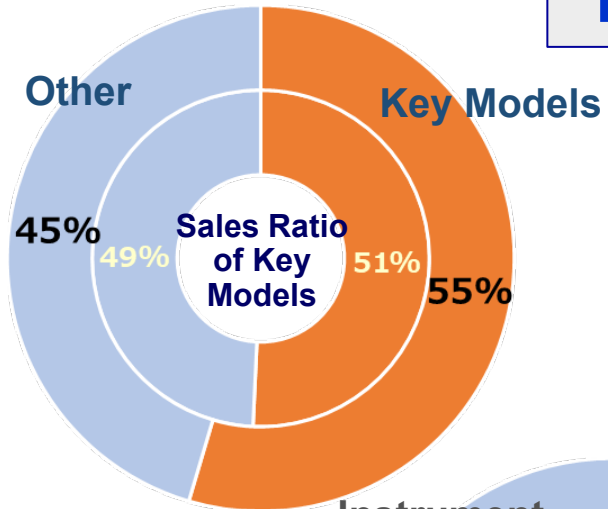


GC-2030
Gas Chromatograph
(GC)

I. Overview of Analytical & Measuring Instruments Business — 2/4

2) Breakdown of Net Sales

FY 2020 Net Sales: 248.6 Billion Yen (Outer Ring)
FY 2014 Net Sales: 192.6 Billion Yen (Inner Ring)



3) Product Portfolio

Pharmaceuticals & Life Sciences



New



Amyloid MS CL
System for Measuring
Amyloid Peptides in Blood



New Nexera Series
Ultra High Performance
LC System

New



Nexera XS inert
Ultra High Performance
Liquid Chromatograph

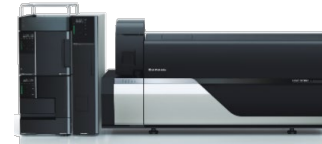


LC-2050/2060
Integrated High-
Performance Liquid
Chromatograph

New



Compact SQMS
LCMS-2050



LCMS-8060NX
Mass Spectrometer

New



Amprep
Analyte Pretreatment
System



LCMS-9030 (Q-TOF)
Mass Spectrometer

New



E484A Primer/Probe Set
for COVID-19 Variant (Omicron)
Detection



Nexis GC-2030
Gas Chromatograph

Environment/Energy



New



TOC-1000e
On-Line TOC
Analyzer for
Purified Water



TNP-4200
On-Line Total
Nitrogen and Total
Phosphorus
Analyzer

New



EDX-7200
Energy Dispersive
X-Ray
Fluorescence
Spectrometer

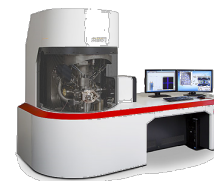


ICPMS-2030
ICP Mass
Spectrometer

New



**Xslicer SMX-
1010/1020**
Microfocus X-Ray
Inspection
System



AXIS ULTRA2
Photoelectron
Spectrometer

New



SPM-Nanoa
Scanning Probe
Microscope/
Atomic Force
Microscope

Materials



AUTOGRAPH AGX-V
Tabletop Universal
Tester

New



AP225W-AD
Electronic Balance

New



LC-Raman
System

4) New Products in FY 2021

New

Pharmaceuticals and Life Sciences



Accurately analyzes Alzheimer's disease biomarker from a small quantity of blood.

Amyloid MS CL System for Measuring Amyloid Peptides in Blood



Flow lines made of metal-free materials. New LC model with high acid and base resistance.

Nexera XS inert Ultra High Performance Liquid Chromatograph



Compact MS combining with the usability of LC detector and high performance of MS.

Compact SQMS LCMS-2050



Helps increase PCR testing efficiency by rapidly processing multiple analytes to achieve high throughput.

Amprep Analyte Pretreatment System



Enables efficient screening in combination with core kit for COVID-19 variant detection.

E484A Primer/Probe Set for COVID-19 Variant (Omicron) Detection

Environment/Energy



eTOC series model that offers a small size, light weight, high sensitivity, and mercury-free design.

TOC-1000e On-Line TOC Analyzer for Purified Water



EDX-7200 Energy Dispersive X-Ray Fluorescence Spectrometer

Enables high-speed high-sensitivity analysis of hazardous elements in electronic parts or impurities in pharmaceuticals.



Xslicer SMX-1010/1020 Microfocus X-Ray Inspection System

Offers easier operability, faster examinations, and a pay-as-you-go service plan for the X-ray tube.



SPM-Nanoa Scanning Probe Microscope/Atomic Force Microscope

Mid-range SPM model that offers automated operability and high throughput.



AP225W-AD Electronic Balance

High-end series with greater convenience, such as automatic doors and touchless sensors.

Materials



II. Growth Strategies for Analytical & Measuring Instruments Business

1) Growth Strategies and their Deployment

Taking on New Challenges to Achieve Additional Growth

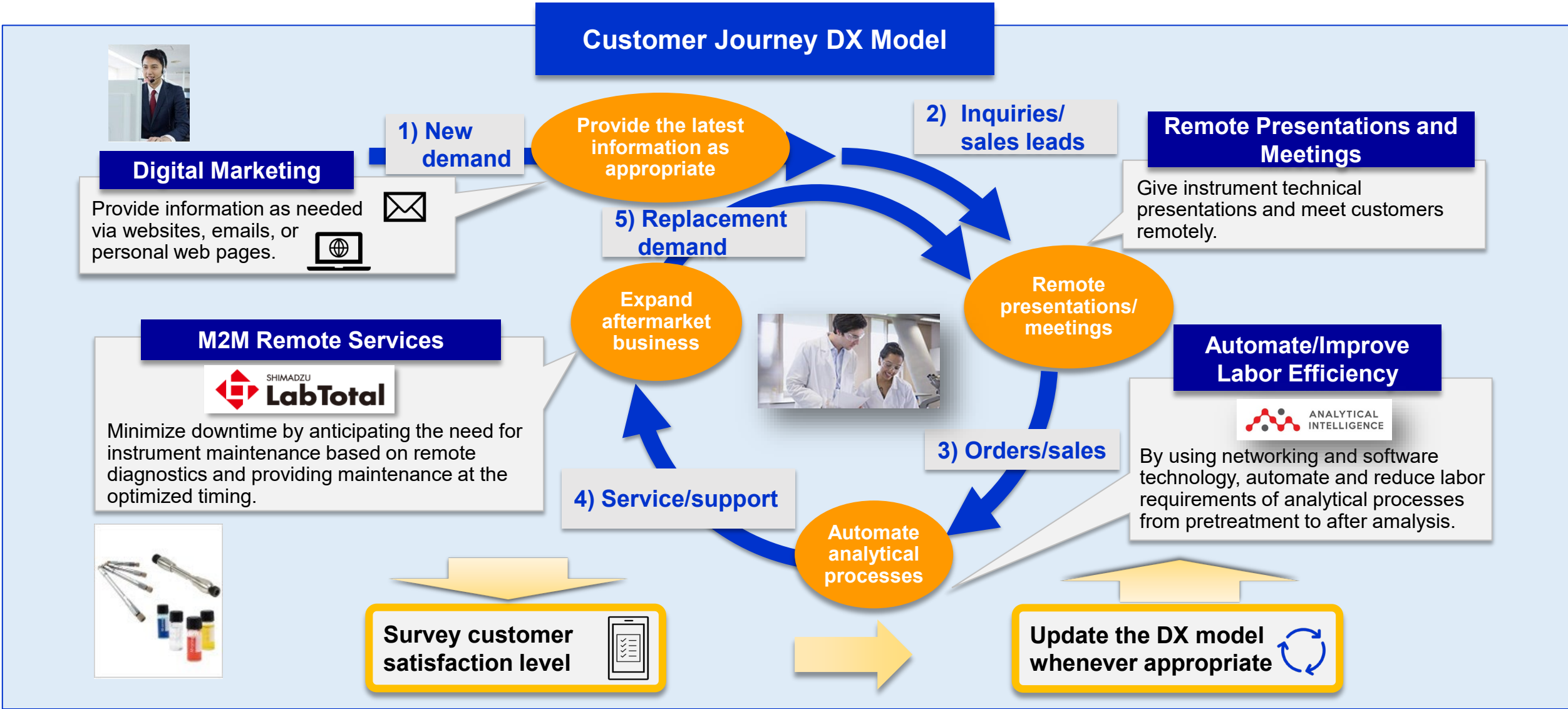
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|------------------------------|--|
| 1) DX | :Accelerate digital transformation measures that promote business. |
| 2) Market Strategies | :Measures in core fields—Healthcare, materials, environmental, and foods
Measures in key regions outside Japan—China, North America, and Europe |
| 3) Product Strategies | :Expand/improve key models, offer systems for automating analysis, and expand/improve consumables and reagent product lines. |
| 4) R&D Strategies | :Prepare global development capabilities and strengthen software development. |

Growth Strategies

Deployment (Medium-Term Management Plan)	Area	Business Fields	Challenges in Society	Issues Addressed by Shimadzu
	Human health	Pharmaceutical Life science Clinical	<ul style="list-style-type: none"> Developing new revolutionary drugs, such as oligonucleotide therapeutics and antibody drugs Strengthening infectious disease countermeasures Promoting healthcare that is efficient for addressing aging society Promoting preventive healthcare 	<ul style="list-style-type: none"> ✓ Drug discovery support ✓ Cellular analysis ✓ Infectious disease testing and therapeutic drug development support ✓ Diagnosis and treatment support
	Global environment	Materials & chemicals Environment	<ul style="list-style-type: none"> Promoting carbon neutrality Transitioning to electric vehicles and aircraft 	<ul style="list-style-type: none"> ✓ Support for developing new high-performance batteries and lighter materials ✓ Support for alternative and renewable energy development
	Safety and security	Foods Forensics (academia)	<ul style="list-style-type: none"> Improving the safety of foods Stronger countermeasures for illegal drugs and doping 	<ul style="list-style-type: none"> ✓ Analysis of residual pesticides and regulated substances ✓ Accurate analysis of increasingly complex illegal/regulated chemicals

II. Growth Strategies for Analytical & Measuring Instruments Business — 2/16

2) DX Model for Analytical & Measuring Instruments Business



3) Measures in Core Fields

II. Growth Strategies for Analytical & Measuring Instruments Business — 3/16

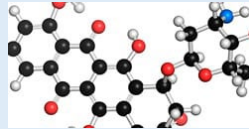
Analytical Instrument Market Growth and Shimadzu Business Deployment

Sustained Market Growth

Market size is about \$66 billion (2020) and expected CAGR is about 5 % (2020 to 2025)

1. **Pharmaceuticals:** Deploy measures for **oligonucleotide therapeutics** and strengthen measures for **CRO/CDMO**.
2. **Increase laboratory productivity:**
Deploy **analysis automation systems**.
3. **Life sciences** : Offer **cellular analysis solutions**.
4. **Clinical** : Deploy measures in **infectious disease, Alzheimer's, and cancer fields**.
5. **Carbon neutrality**
6. **Materials** : Contribute to developing **new materials** and promoting **EVs**.

<Lab>



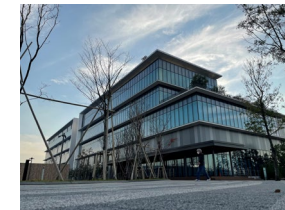
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Healthcare R&D Center (Kyoto)



Technology Research Laboratory (Keihanna City)



Tokyo Innovation Center (scheduled to open in Oct. 2022)

1. Pharmaceuticals — 1/3: Oligonucleotide Therapeutics (1)

Growth Strategies in Oligonucleotide Therapeutics Field

Accelerate Measures for Oligonucleotide Therapeutics Considered Middle Molecules —Build and Offer Comprehensive Solutions for R&D of Oligonucleotide Therapeutics—



- 1) Instruments: Build high-end systems, mainly for LC, LC/MS, or pretreatment.
- 2) Columns/software: Promote partnering with specialized companies to offer a broad range of solutions, such as specialized columns and data analysis software.

Deploy Measures in Oligonucleotide Therapeutics Field

Test planning and execution

Experiment protocol management software



- Decide analysis priority order.
- Specify pretreatment settings, etc.



Pretreatment

Robotic pretreatment system



- Automate loading samples.



Analysis

LC and LC/MS



- Analyze and post-treat samples automatically.

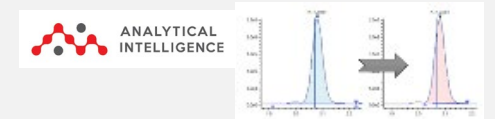
Posttreatment

Preparative purification system



Automate data analysis

AI-based data analysis software



- Analyze data from analysis results automatically.

Oligonucleotide therapeutics are a third type of drug, following small-molecule drugs and antibody drugs. They are manufactured by chemical synthesis with a nucleotide backbone. Due to their ability to target specific molecules inside cells, such as RNA or mRNA molecules, oligonucleotide therapeutics are being researched and developed in an effort to create revolutionary drugs for cancers and genetic disorders. Their ability to be administered orally is another key characteristic.

1. Pharmaceuticals — 2/3: Oligonucleotide Therapeutics (2)



**New Product
launched in
Feb. 3, 2022**

Ultra High Performance Liquid Chromatograph

Nexera XS inert

EXPERIENCE

NEFOUND CLARITY

New LC System for Oligonucleotide Therapeutics Development

- Middle molecule oligonucleotide therapeutic drugs are actively being researched and developed as the next generation of drugs, following conventional small molecule drugs and high molecule antibody drugs.
Small molecules have a weight less than 500, middle molecules have a weight between 500 and 2,000, and high molecules have a weight around 150,000.
- Provides highly reliable data by inhibiting adsorption or residues in analytical flow channels required for separating and analyzing biological samples and also by eliminating rust concerns for acidic solutions.
- In addition to applications for oligonucleotide therapeutics and antibody drugs, also offer the system for analyzing chemicals and functionally-enhanced foods.

1. Pharmaceuticals — 3/3: CRO and CDMO

Ultra-Fast Multianalyte Processing LC/MS System for CRO & CDMO Use

- This ultra-fast multianalyte analysis system is intended for CRO and CDMO that analyzes large volumes of samples.
- It was jointly developed at the US Innovation Center in partnership with a major contract analysis company and was commercialized for CRO and CDMO needs.
- Enables multianalyte processing for maximizing MS system utilization rates, without sacrificing sensitivity or accuracy levels.
- Configured with multiple LC units and one MS unit, the system can achieve high throughput rates and increase customer productivity by continuous uninterrupted analysis of samples.

CRO (Contract Research Organization)

CROs are companies specialized in conducting specific development, testing, or application processes mainly for pharmaceuticals on a contract basis.

CDMO (Contract Development and Manufacturing Organization)

CDMOs are companies specialized in performing a broader range of pharmaceutical processes, such as developing drugs, manufacturing investigational new drugs, or commercial production.



2. Analysis Automation Systems

Growth Strategies for Analysis Automation

Build Advanced Systems for Automating Pretreatment Processes Essential for Analysis —Improve Laboratory Labor Efficiency and Contribute to Increasing Analytical Productivity and Safety—

- 1) **Develop a system for performing laboratory experiments autonomously (Autonomous Lab) using robotic, digital, and AI technologies.**
- 2) **Expand/improve robotic pretreatment systems.**
- 3) **Build a flexible system that is compliant with international OPC UA standards for automation and standardization.**

<Autonomous Lab>

- **Develop an autonomous lab system for smart cells (artificially produced cells) and start demonstration experiments at the Kobe University biofoundry (photographs).**
- **Promote the autonomous lab system in growth fields, such as biotech, pharmaceuticals, and new materials.**



<Automatic Pretreatment>

Current Instruments

- Automatic pretreatment system
- Nucleic acid extraction system
- Liquid handler
- Analytical network system



Newly Developed Instruments

- Inter-instrument conveying system: Increases continuous analysis capacities.
- Dedicated pretreatment system
- Robotic pretreatment system
- Pretreatment modules: A variety of modules for customer needs



3. Cellular Analysis Solutions

Growth Strategies for Cellular Analysis

Build a Combined Data Analysis Platform for Cells

—Combination of LC/MS, ICP/MS, and Other Existing Analytical Instruments with New Technologies, Such as Culture Medium Manufacturing and Data Analysis Software Technologies—

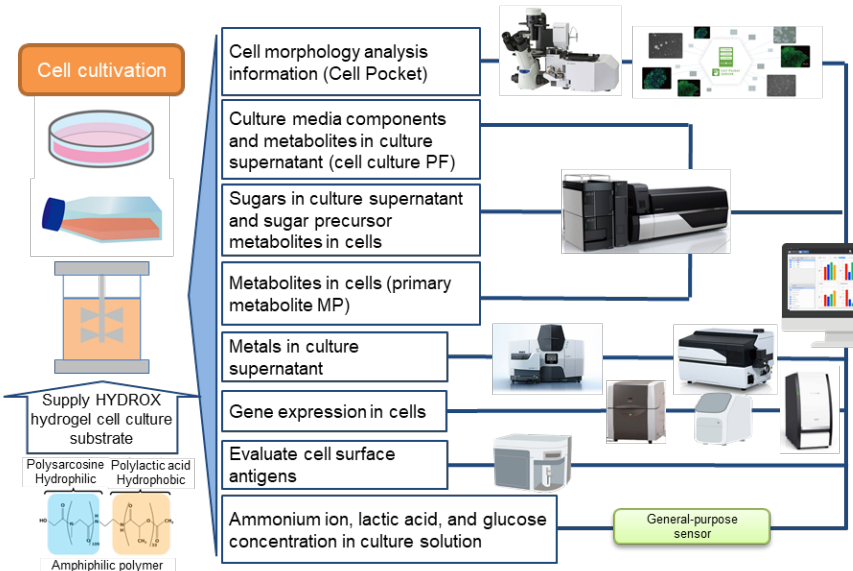
- 1) Culture media manufacturing technology: Contribute to improving customer cell production by partnering with specialized companies to engage in customizing culture media based on core culture media manufacturing technologies.
- 2) Data analysis software: Partner with a startup company that has advanced expertise to jointly develop new software that uses AI to optimize culturing parameters and collect data.

Culture Medium Manufacturing

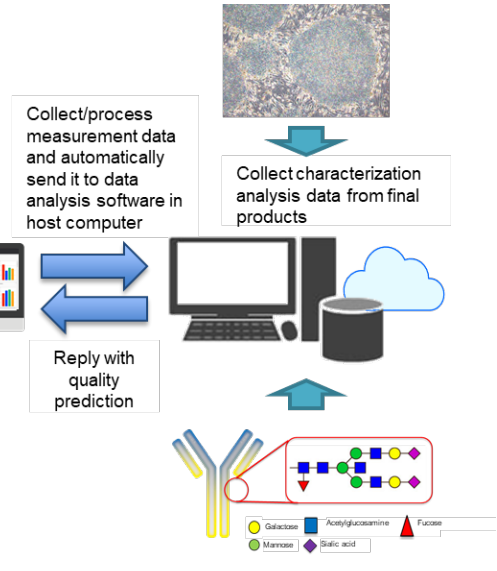
Contribute to improving customer cell production by offering culture media for a wide variety of customer needs.



Analysis



Data Acquisition



II. Growth Strategies for Analytical & Measuring Instruments Business — 9/16

4. Clinical — 1/4: Infectious Diseases (1)

Products

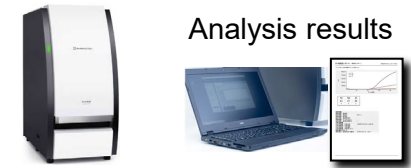
Creating Systems

Virus Testing

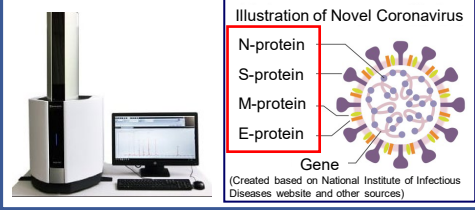
PCR Testing Reagent
Also detects omicron and other variants.



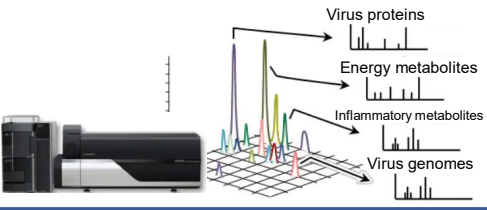
PCR Testing System



MALDI-TOF/MS
Rapid virus testing



LC/MS
Virus testing and severity prediction



Help Establish PCR Testing Centers
(In Universities/Companies)



Variants Analysis
Whole-genome sequencing



Testing Data Management System

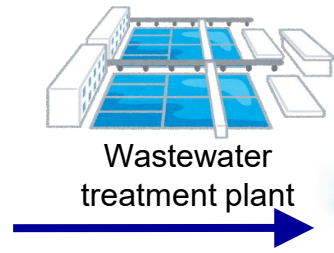
- Automatically sends patient information and examination/test results and prints barcodes.
- Sends information entered in electronic medical records to the PCR testing system and executes the PCR test.
- Sends test results to electronic medical records.

PCR Testing System Linked to Electronic Medical Records

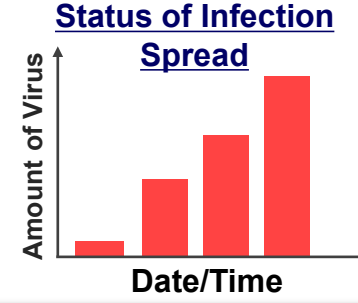


Predicting and Determining Spread of Infection

Geriatric nursing homes, hospitals, etc.



Sewer Water Monitoring



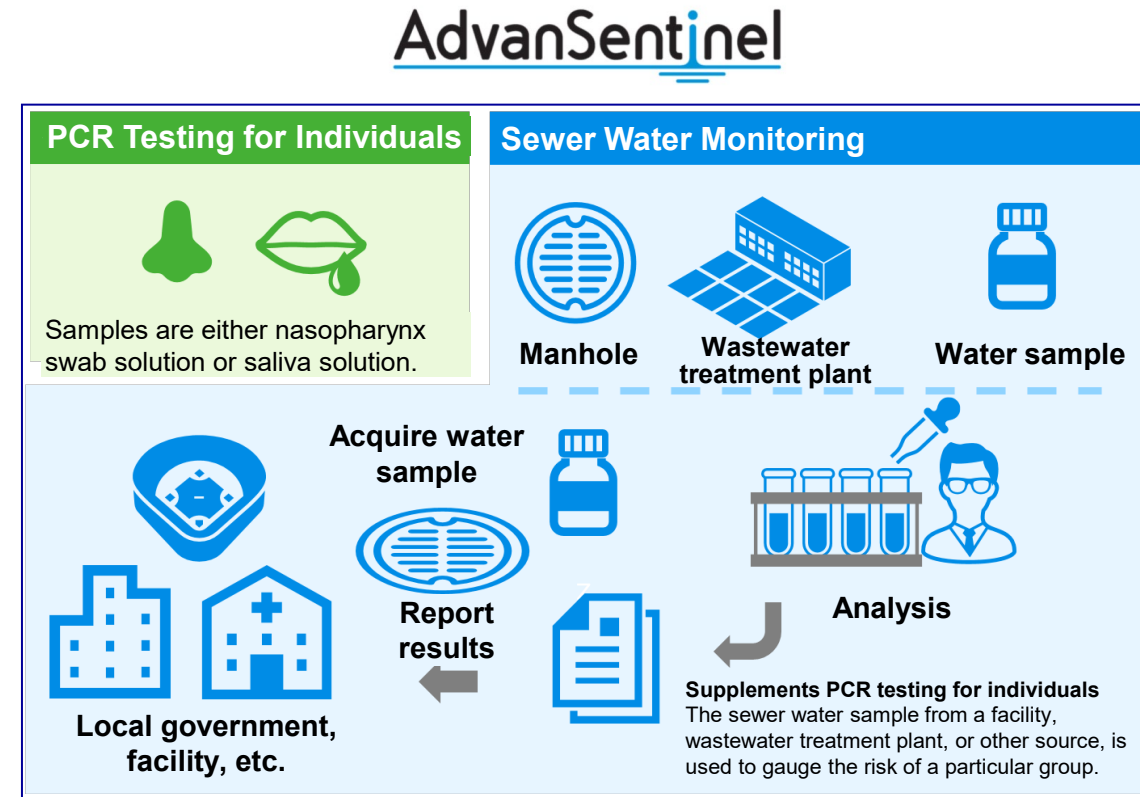
4. Clinical — 2/4: Infectious Diseases (2)

In order to start monitoring sewer water for COVID-19 (SARS-CoV-2) and other infectious diseases in society as soon as possible, on January 20, 2022 Shimadzu Corporation and Shionogi & Co., Ltd. established a joint business organization for the sewer water monitoring business.

Step by Step

- 1) Establish the system in society as soon as possible as a countermeasure for COVID-19 infections.
- 2) Quickly establish a system to be prepared in case another pandemic is predicted (early alert system).
- 3) Expand the scope of the sewer water monitoring and expand/improve the list of various infectious diseases, chemicals, and other substances monitored.

- **Company name:** AdvanSentinel Inc.
- **Capital investment ratio:** Shimadzu Corporation 50 % and Shionogi 50 %
- **Main business:** Risk management of public health using sewer water monitoring (Refer to figure to the right.)



4. Clinical — 3/4: Alzheimer's Disease

Growth Strategies for Clinical Fields

Achieve a Healthy Life Cycle by Deploying Mass Spectrometry Technology in Clinical Fields

- Apply accurate simultaneous multianalyte analysis for clinical applications.
- Offer solutions for each stage of Alzheimer's Ultra-early screening, diagnosis, treatment, and prognosis.

Ultra-Early Diagnosis

Diagnosis

Treatment

Prognosis Management and Prevention

MS analysis of amyloids in blood

MCI screening

Alzheimer's disease drug discovery

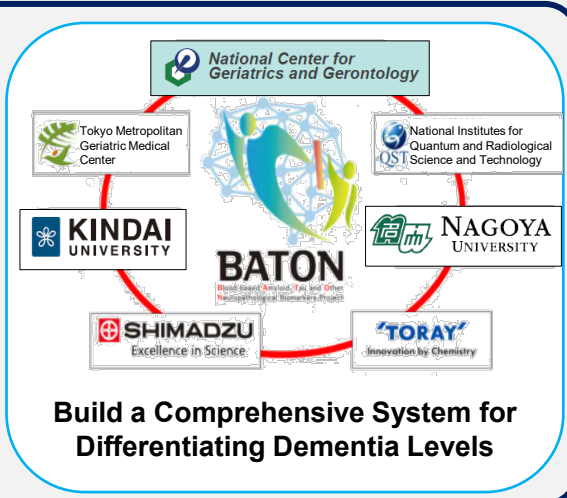
Brain function measurement

Functionally-enhanced foods

North America:

Partner with a major clinical testing company and implement license business for amyloid MS analysis method.

Japan: Achieve insurance coverage for amyloid MS analysis method and implement license business for clinical testing institutions.



Accumulate time-series data from large cohort intervention studies and establish scientific evidence.

- Create new certification standards for functionally-enhanced foods.
- Develop method packages or pretreatment methods.
- Deploy globally.

Agricultural Institutions
New techniques for food analysis

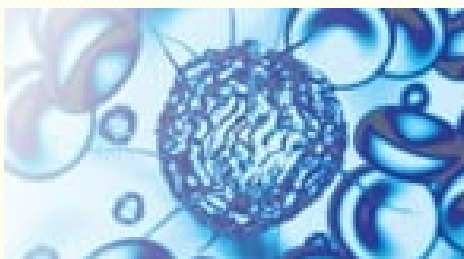
Food/Beverage Companies
New development of functionally-enhanced foods

NARO-Shimadzu Laboratory
—NARO Shimadzu Kyoto Laboratory for Food Innovation—

4. Clinical — 4/4: Cancer, Depression, and TDM

Accelerate R&D

Disease, etc.	R&D Topic	Overview	Joint Development Partner
Accelerate Research and Development			
Cancer	Early screening of multiple cancers, such as colon and breast cancers	Develop methods using GC/MS and LC/MS (triple quadrupole) based on metabolomic analysis for detecting cancers at an ultra-early stage.	Hyogo College of Medicine
	Biomarkers for cancer immunotherapy	Identifies antibody drug biomarkers by cancer immunotherapy using Shimadzu nSMOL method for measuring concentrations in blood.	Providence Cancer Institute in the U.S.
Depression	Depression biomarkers	Develop an early diagnosis system based on a combination of depression biomarkers in blood and contents of patient interview.	Kyushu University Hospital
Therapeutic Drug Monitoring (TDM)	TDM platform	A reagent kit is used to collect a blood sample at home and send it to a hospital for LC/MS inspection of efficacy/adverse effects.	Jichi Medical University



5. Carbon Neutrality

Growth Strategies for Carbon Neutrality

1) NEDO Green Innovation Fund

Promote compliance with new environmental regulations through advancements in existing technologies and collaboration.

2) Participate in a Biofoundry

Establish methods for evaluating various materials and products using biological raw materials.

Green Innovation Fund Utilization



Green Innovation Fund (2 Trillion Yen Total)

Newly established by NEDO to achieve carbon neutrality by 2050

- Specifications and standards for techniques used to burn and manage fuel ammonia
- Method for measuring CO₂ absorption and evaluating the strength of CO₂ absorbing concrete
- Evaluation of materials in liquid hydrogen environment
- Specifications and standards for methane synthesized by methanation



Gas Chromatograph

Biofoundry Participation



Joint Operation with Bacchus Bio innovation, Japan's First Biofoundry Company

Develop various methods and standards for evaluating plastics and other products made with biological raw materials used as a substitute for petroleum-based raw materials.

Build an automated and **integrated platform** that consolidates in one place the various technologies, knowledge, instruments, and other things needed for manufacturing with microorganisms.

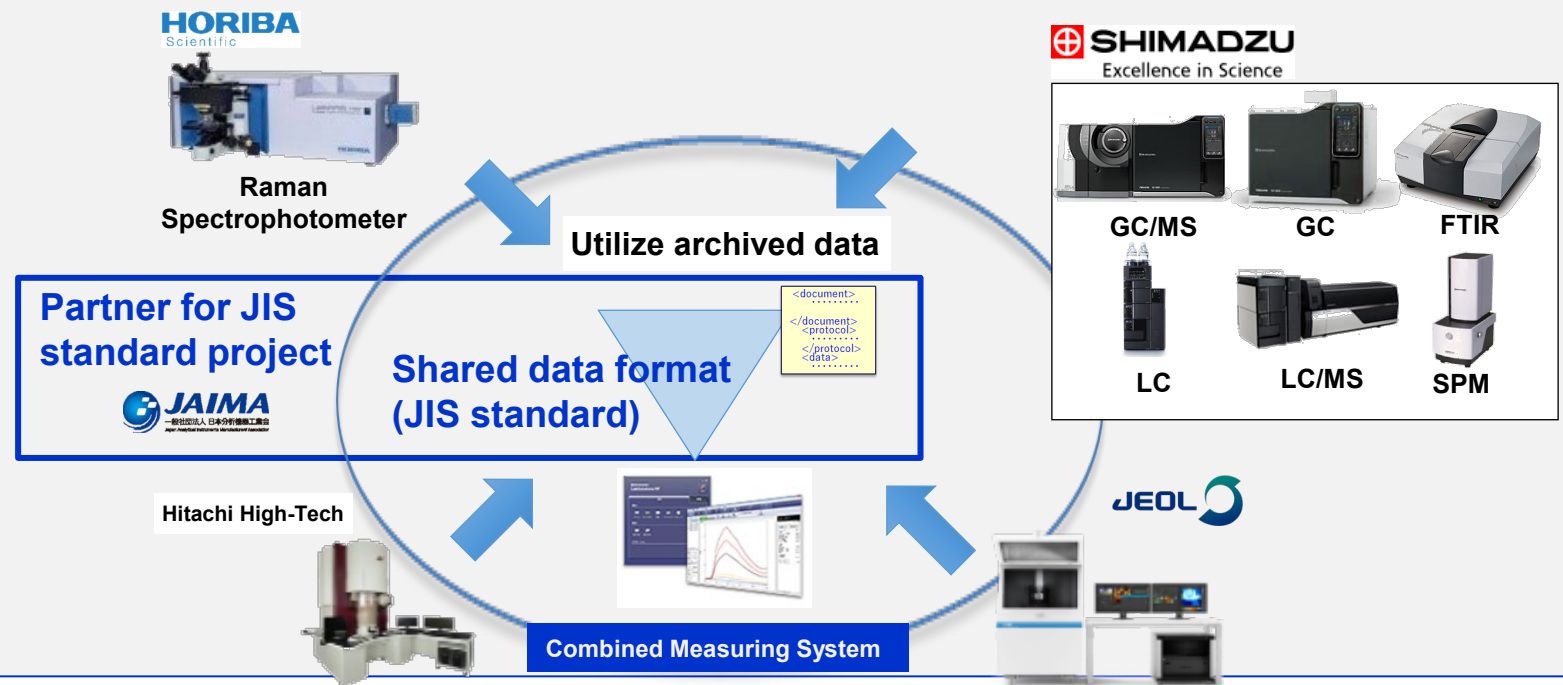


6. Materials: Develop New Materials and Contribute to Promoting EVs

Growth Strategies for the Materials Field

- 1) Build an analytical data platform that supports new material development.
- 2) Develop technologies and offer systems that contribute to developing and evaluating the safety of mechanical parts in order to promote EVs.

Build a Common Format for All Analytical Data



4) Measures in the U.S., EU, China, and Asia

II. Growth Strategies for Analytical & Measuring Instruments Business — 15/16

1. Measures in the U.S., EU, China, and Asia: U.S., EU, and Asia

Deploy the development results achieved at Innovation Centers in the U.S., Germany, and Singapore and develop new demand in respective regions.

■ Deploying Business in the U.S.



- **Pharmaceuticals:**
Promote joint development projects with customers and offer unique solutions to major pharmaceutical and academia customers.
- **Clinical:**
Develop a new mass spectrometry-based immunotherapy method with the Providence Cancer Institute and promote joint operations for amyloid beta analysis with a clinical testing company.
- **Environmental:**
Respond to demand for analyzing regulated per- and polyfluoroalkyl substances (PFASs), lithium-ion batteries, etc.

■ Deploying Business in the EU



- **Clinical:**
Deploy analytical solutions for IVDR (In Vitro Diagnostic Medical Device Regulation)
- **Pharmaceuticals:**
In addition to pharmaceutical and CRO customers, also expand deployment of preparative SFC and other advanced solutions to large pharmaceutical companies.
- **Environmental:**
Offer GC or other solutions for clean gas analysis, offer solutions for achieving carbon-neutrality, and offer new GC application software or other solutions to lithium-ion companies and others.

■ Deploying Business in Asia



- **Pharmaceuticals:**
Strengthen networking and software development for India and develop new demand in Southeast and South Asia.
- **Clinical:**
Deploy the neonatal screening business and promote the reagent business with recurring revenues.
- **Food safety:**
In response to the deployment of the new JIS method outside Japan by the Japanese Ministry of Agriculture, Forestry and Fisheries, propose the analytical method to the Thailand National Science and Technology Development Agency.

2. Measures in the U.S., EU, China, and Asia: China

Growth
Strategies
in China

Respond to Increasingly Sophisticated Customer Needs and Offer Comprehensive Added Value for Analytical Instruments

— Strengthen and Complete All Functions in China, including Marketing, Development, Manufacturing, Sales, and Aftermarket —



- 1) Develop and manufacture high-end products in China in response to incentives for domestic products.
- 2) Promote joint development: Establish a new innovation center organization for promoting joint research and development with Chinese companies and academic institutions.
- 3) Actively respond to demand for compliance with China-specific pharmaceutical, food, and environmental regulations.
- 4) Expand the aftermarket business.

Innovation Center

Heading up Open Innovation

- Plan/implement joint research with KOLs (key opinion leaders) or other advanced Chinese companies.
- Conduct the development of products and applications that will ensure business growth in the medium and long term.

Promoting the Aftermarket Business

- Comprehensively deploy businesses offering service contracts, consumables, application development support, contract analysis, temporary personnel, and instrument rentals.
- Use the above to achieve sustained growth of the analytical and measuring instruments business in China.

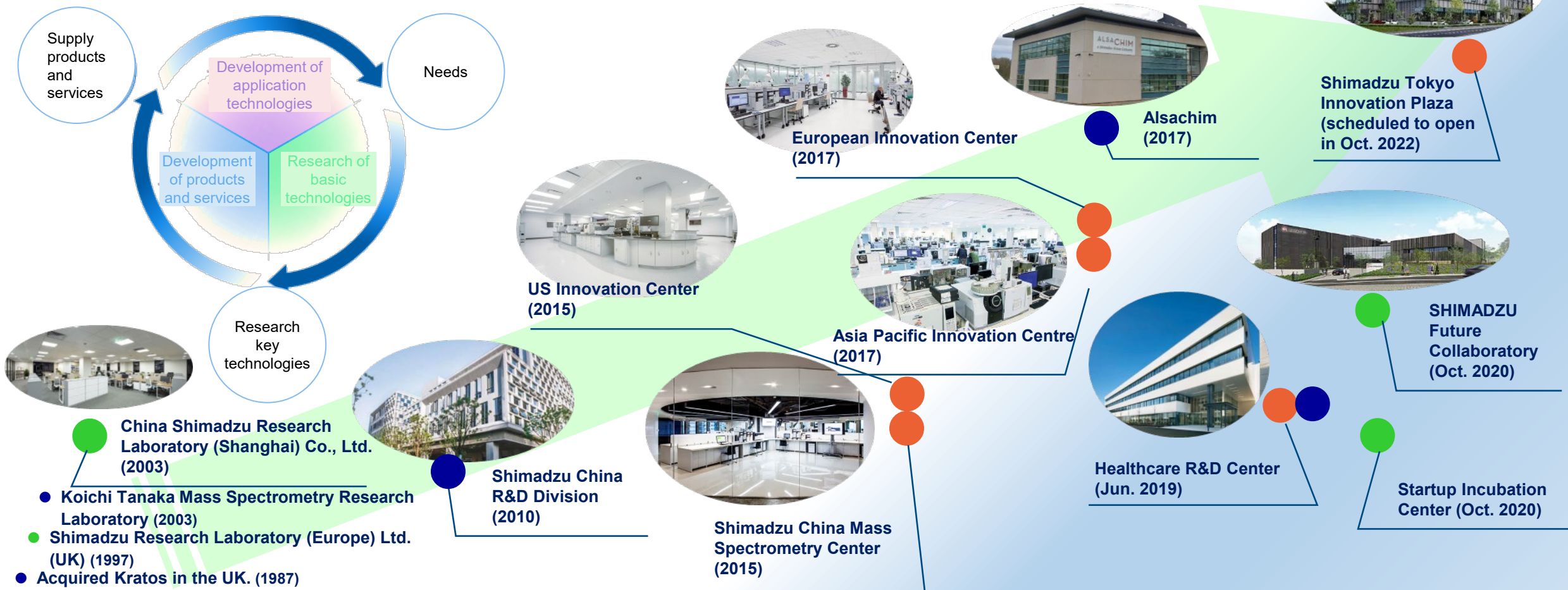
III. R&D Strategies for Analytical & Measuring Instruments Business

III. R&D Strategies for Analytical & Measuring Instruments Business — 1/7

1) Global R&D Capabilities — Create New Value —

- Research of basic technologies
- Development of products and services
- Development of application technologies

- Expand application development functions to build a stronger foundation for global growth.
- Accelerate innovation and develop basic technologies that will promote new business creation.
- Develop and commercialize advanced technologies through joint research and open innovation.



2) Basic Technology Research Locations

Research of Basic Technologies



Shimadzu Future Collaboratory (Kyoto prefecture)

- Promote research and development of advanced analysis, the brain/five senses and innovative biotechnology, AI (artificial intelligence), etc.
- Use open innovation to create new value and solve challenges in society.



Shimadzu Research Laboratory (Europe) Ltd.



Shimadzu Research Laboratory (Shanghai) Co., Ltd.



Koichi Tanaka Mass Spectrometry Research Laboratory

3) Product and Service Development Locations

Development of Products and Services



Healthcare R&D Center

- ▶ KYOLABS collaboratory R&D lab intended for creating revolutionary technologies.
- ▶ Partners occupy 8 laboratories within Cooperation Labs
 - Joint research with the National Agriculture and Food Research Organization (NARO) on analyzing functional benefits of foods
 - Joint research with Kobe University on early screening of colon cancer
 - Collaboration with Kyushu University on metabolomic analysis, etc.



Shimadzu China R&D Division



KRATOS (UK)



Software Development Locations outside Japan

Development of LabSolutions laboratory networking system, etc.

- UK: MS Overseas
- Singapore: Software Development Center
- Canada: Shimadzu Software Development Canada

4) Application Technology Development Locations

Development of Application Technologies



Shimadzu Tokyo Innovation Plaza (scheduled to open in Oct. 2022)

Located within the Tonomachi King Skyfront district (in Kawasaki City, Kanagawa)

- Located conveniently near Tokyo International Airport(Haneda), the Tonomachi King Skyfront district is an open innovation site for developing new industries based on among the most advanced research and development in the world.
- As the global central location for application development, the Innovation Centers facilitate a broad range of collaborations intended for commercialization.



US Innovation Center



Shimadzu China Mass Spectrometry Center



European Innovation Center



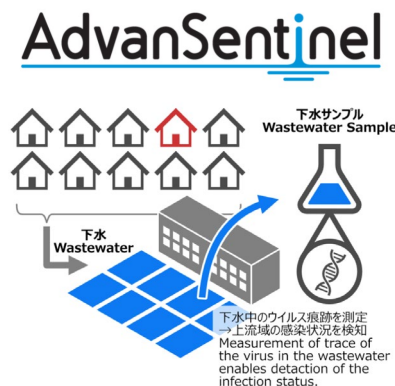
Asia Pacific Innovation Centre

5) Collaborations — 1/3

Companies in Japan

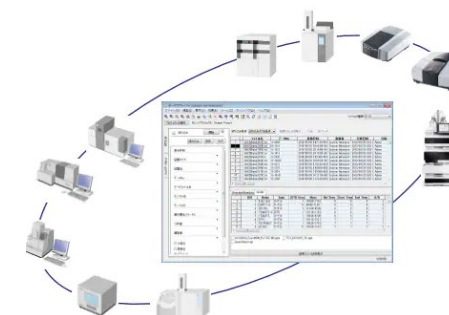
Collaboration with Shionogi & Co., Ltd. for Commercializing Sewer Water Monitoring

Shimadzu established AdvanSentinel, a joint venture with **Shionogi & Co., Ltd.**, to evaluate public health risks by monitoring sewer water or other means. We are building a Japan-wide organization for assessing not only COVID-19 infections, but also future epidemics and other public health risks.



Collaboration with Rigaku for Pharmaceutical, Food, and Chemical Markets

Shimadzu will jointly sell **Rigaku** X-ray systems with Shimadzu LabSolutions DB/CS software used to manage analytical data from those systems. Centrally managing the data from both Shimadzu and Rigaku systems will increase the reliability of data in compliance with various regulations.



Collaboration with Horiba for Joint Development of LC-Raman Systems

This utilizes the strengths of both companies by combining a Shimadzu high-performance liquid chromatograph (LC) with a **Horiba** Raman spectrometer. The collaboration will supply new solutions for growth markets, such as healthcare, pharmaceuticals, and other life science markets, or for advanced material development applications.



Collaboration with Mitutoyo for Selling Dimensional X-Ray CT Systems

The XDimensus 300 dimensional X-ray CT system was added to the **Mitutoyo** product line. In the future, we will expand cooperation over a broad range of activities, such as expanding/improving jointly sold products, jointly developing new products, and developing new sales channels outside Japan.



XDimensus 300 Dimensional X-Ray CT System

Developing iPS Cell Therapy for Kidney Disorders

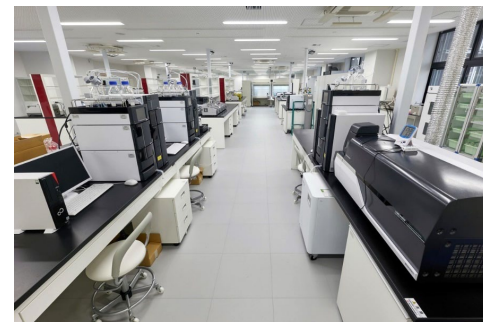
Shimadzu is partnering with **Rege Nephro**, a startup company originating from **Kyoto University** to jointly research methods for monitoring cell quality and manufacturing processes during development of cell therapies for kidney disorders. Shimadzu will promote open innovation for R&D of cell cultivation solutions.



The LCMS-9030 High-Performance Liquid Chromatograph Mass Spectrometer Used for Research

Participating in a Biofoundry for Achieving a Carbon-Free Society

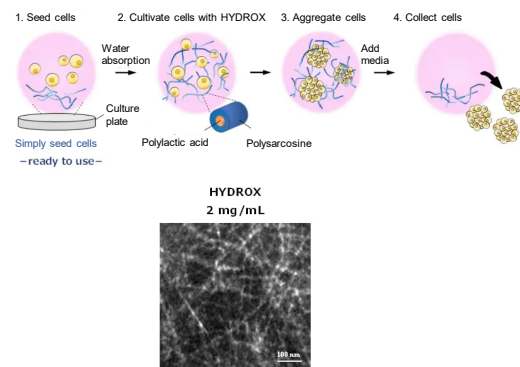
Shimadzu started joint operations with **Bacchus Bio innovation**, a startup company from Kobe University and Japan's first biofoundry-type company to achieve a carbon-free society. The collaboration will accelerate the development of various evaluation methods and creation of evaluation standards used when migrating from conventional petroleum or natural gas-based production methods, which consume large amounts of energy, to biotechnology-based production methods.



Laboratory at Bacchus Bio innovation

Accelerating Open Innovation for Cell Cultivation Solutions

Shimadzu has been offering HYDROX three-dimensional nanofibers, which enable simple and safe three-dimensional cell cultivation, to research institutions and engaging in open innovation. Joint research with the **Graduate School of Pharmaceutical Sciences at Osaka University** achieved a simple three-dimensional cultivation method that can be used to differentiate human iPS cells into liver cells.



Innovation by Industry-Academia Collaboration for Early/Rapid Diagnosis and Practical TDM

Joint research with the **Jichi Medical University** has started for using mass spectrometry technology in clinical fields. At the affiliated hospital there, Shimadzu is developing MS-based techniques that can contribute to early/rapid diagnosis of various diseases, such as cancer, heart disease, infectious diseases, and dementia; therapeutic drug monitoring (TDM); or preventive medicine.



The LCMS-8050 Liquid Chromatograph Mass Spectrometer Used for Research

5) Collaborations — 3/3

Outside Japan

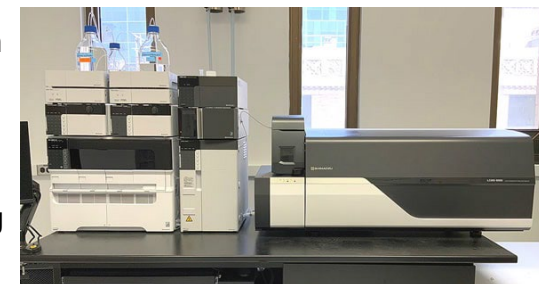
Analysis Center Established at Walsh University in the U.S.

Shimadzu Scientific Instruments, a U.S. subsidiary of Shimadzu, has established an analysis center at **Walsh University** (Ohio State, U.S.). The center is intended for training human resources for scientific fields, for building and maintaining long-term collaborative relationships with educational institutions, and for contributing to local communities.



Mass Spectrometry Technology Used for Advanced Anti-Aging Research

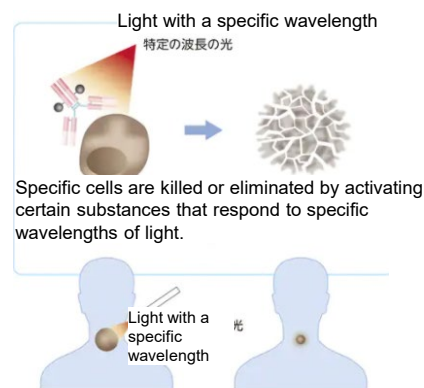
Shimadzu Scientific Instruments, a U.S. subsidiary of Shimadzu, is collaborating with the **Department of Developmental Biology and Department of Medicine at University of Washington School of Medicine** (Missouri State, U. S.) on using mass spectrometry technology for anti-aging research, with a particular focus on understanding the mechanisms that affect aging and life-span in mammals.



The LCMS-8060 Liquid Chromatograph Mass Spectrometer Used for Research

Product Development for Supporting Cancer Photoimmunotherapy

An agreement was signed with **Rakuten Medical, Inc.** (California State, U.S.) to jointly develop and commercialize medical devices related to the Illuminox® Platform. The collaboration will develop medical devices based on optical measurement technology for the purpose of supporting cancer treatment based on photoimmunotherapy.



Mass Spectrometry Technology Contributes to Immunotherapy for Cancer

Shimadzu is participating biomarker R&D of therapeutic antibody drugs for treatment of cancer by immunotherapy being conducted at the **Providence Cancer Institute** (Oregon State, U. S.). It involves researching a new cancer immunotherapy method based on using mass spectrometry, nSMOL Antibody BA reagent kits, and other technologies.



The LCMS-8050 Liquid Chromatograph Mass Spectrometer Used for Research



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Actual results may differ significantly from forecasts about future performance indicated in this document, due to fluctuations in economic conditions, exchange rates, technologies, or various other external factors.

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