

FYE March 2021 Second Quarter Financial Briefing

NAGASE & CO., LTD
November 26, 2020

Summary

■ FYE March 2021 Second Quarter Results

- The COVID-19 pandemic drove a degradation in the world economy, with particularly significant impact on automotive and cosmetics-related markets
- In other regions, while the situation has returned to pre-pandemic levels in Greater China, economic activity is slow in other regions
- The Prinova Group has contributed significantly to profits. However, costs have increased due to factors such as investment toward sustainable growth (e.g. DX promotion)
- Continuation of sale of strategic shareholdings from last year

■ FYE March 2021 Earnings Projections

- We see the COVID-19 pandemic continuing to grow worldwide, so we anticipate that the shift to full-fledged recovery will be in the fiscal year ending March 2022 or thereafter
- We project lower sales and profits overall for the full year

■ Progress of Mid-Term Management Plan ACE-2020

- Released TABRASA, a materials informatics platform as one element of DX promoted by the NAGASE Group
- Established the Sustainability Committee

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FYE March 2021 Second Quarter Results

Consolidated Statements of Income

- **Net sales:** Sales declined because of the impact of the growth of the COVID-19 pandemic
- **Operating income:** Income declined mainly due to increased costs incurred to promote DX as an investment for sustained growth, though gross profit increased due to the high profitability of Prinova Group
- **Profit attributable to owners of the parent:** Profit increased, mainly due to the recording of profits stemming from the sale of certain shares owned by the Company

(100 millions of yen)

	19/09	20/09	Change	Vs. PY	Orig. Forecast (full year)
Net sales	3,919	3,811	(107)	97%	7,540
Gross profit	508	537	+ 29	106%	1,070
<GP ratio>	13.0%	14.1%	+1.1%	—	14.2%
SG&A expenses	402	448	+ 46	111%	920
Operating income	106	89	(16)	84%	150
Ordinary income	105	96	(8)	92%	155
Profit attributable to owners of the parent	74	101	+ 27	137%	125
US\$ Exchange rate (period average)	@ 108.6	@ 106.9	@ 1.7 strong yen		@106.0
RMB Exchange rate (period average)	@ 15.7	@ 15.3	@ 0.4 strong yen		@ 14.7

[Foreign exchange rate impact on 20/09 net sales and operating income results]
 Net sales: ¥(3.5) billion (approx.); Operating income: ¥(0.1) billion

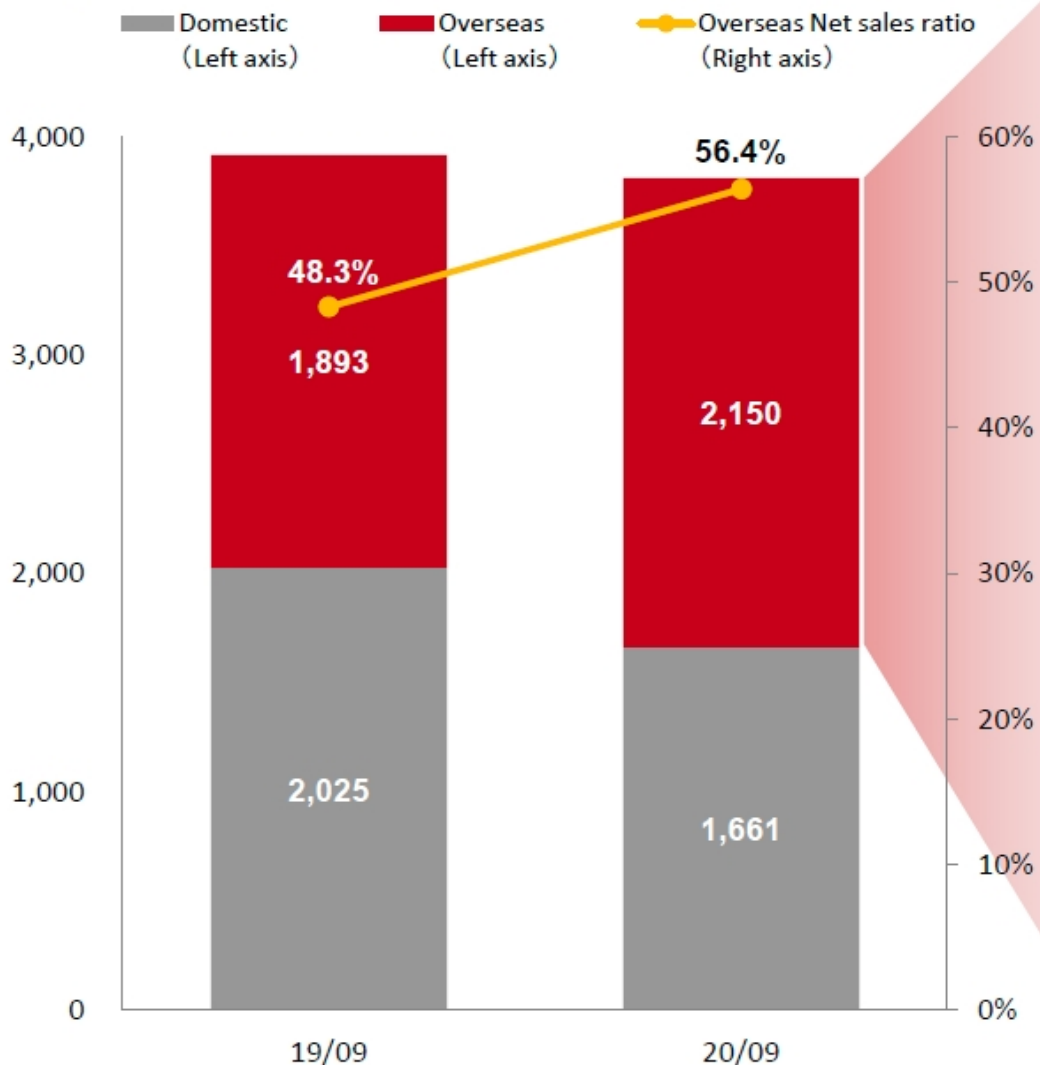
[Per-yen exchange rate impact on net sales and operating income (full year)]

	Impact of US\$/yen	Impact of RMB/yen
Net sales	¥1.0 billion (approx.)	¥8.1 billion (approx.)
Operating income	¥0.0 billion (approx.)	¥0.4 billion (approx.)

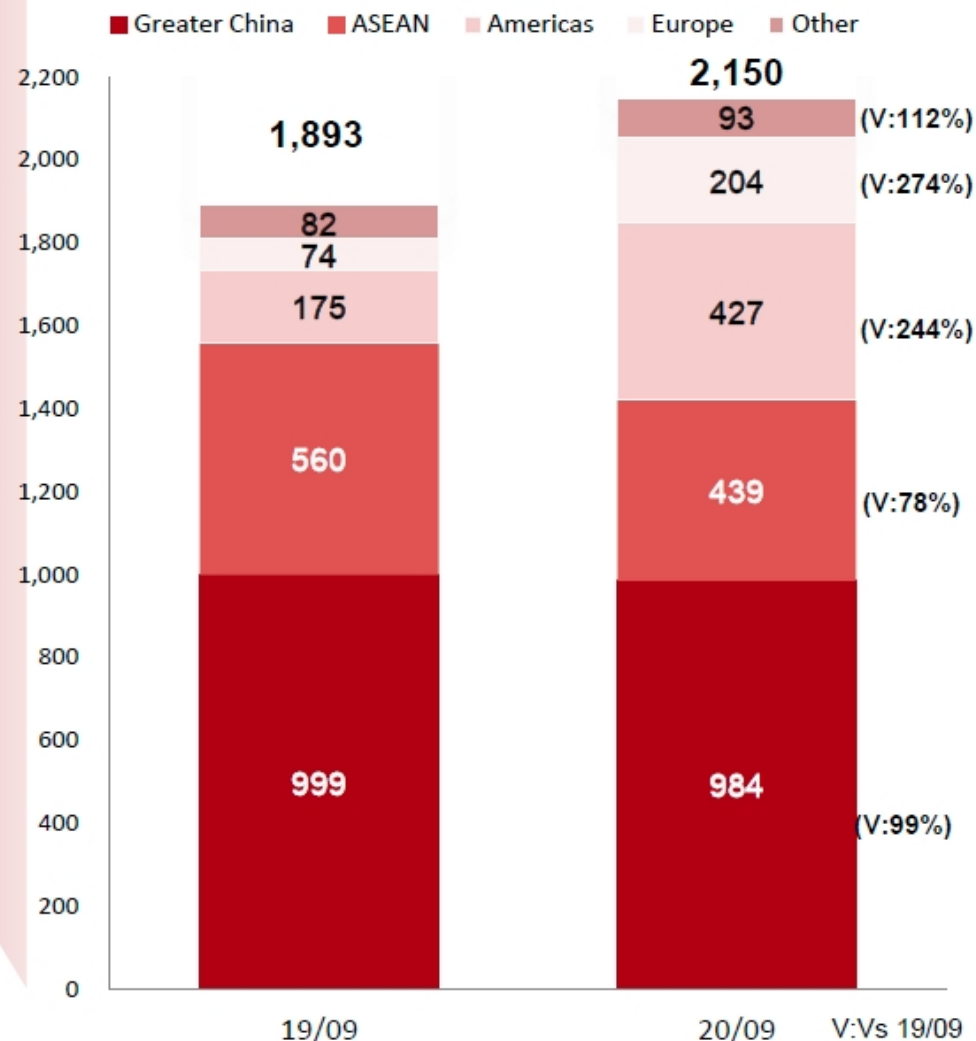
Net Sales by Region (Domestic, Overseas)

- Sales in particular in Japan and ASEAN decreased due to the impact of the growing COVID 19 pandemic, though sales in Europe and America increased sharply due to the addition of sales from the Prinova Group (overseas ratio of total sales: 56.4%)

Domestic & Overseas Sales (100 millions of yen, %)



Overseas Sales by Region (100 millions of yen, %)

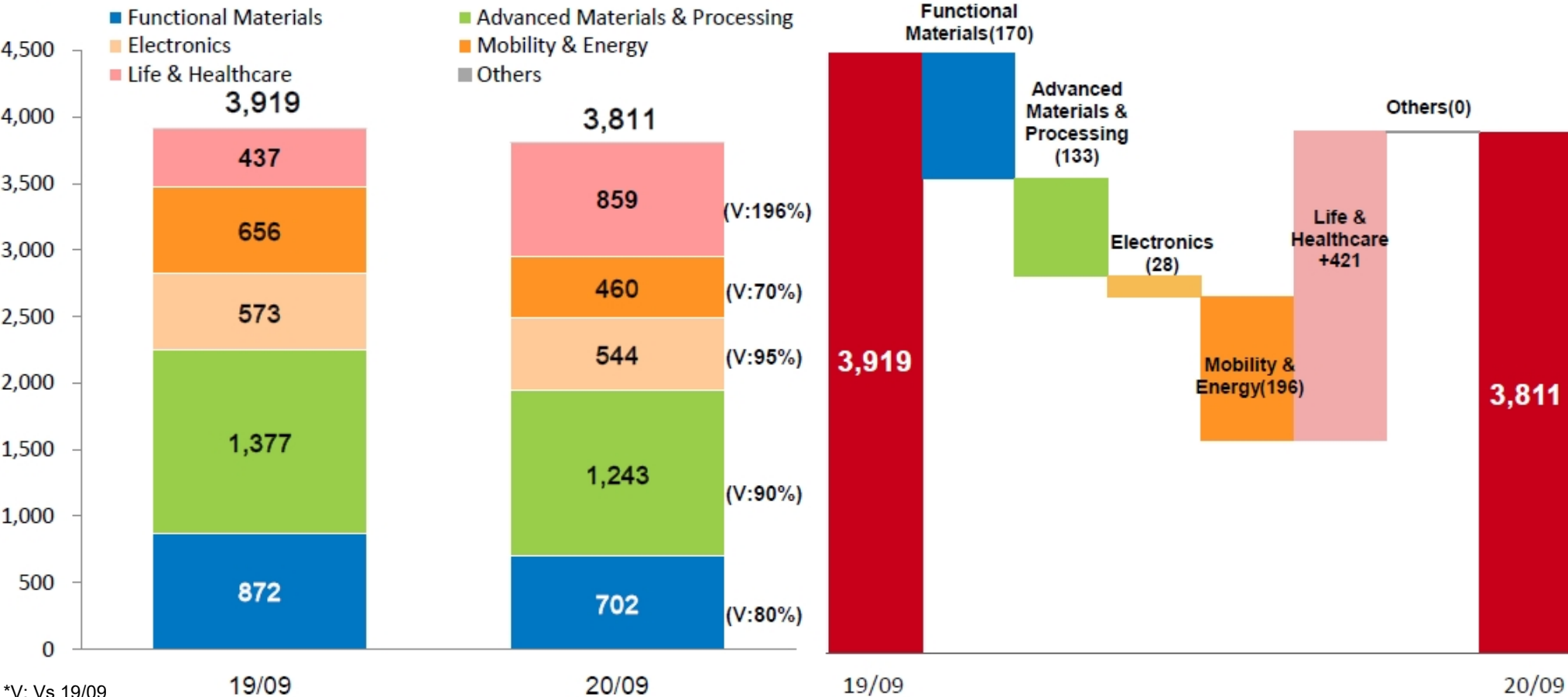


Net Sales: Two Year Comparison (by Segment)

- **Mobility & Energy:** Sales declined due to a decrease in the sales of car electronics-related products in Japan and in the resins business in all regions except Greater China, mainly caused by lower automotive production in all regions except Greater China
- **Life & Healthcare:** Sales increased mainly due to increased sales of pharmaceutical raw materials/intermediates and medical materials and of hygiene products-related materials, and due to the addition of sales from the Prinova Group, factors that compensated for the decline in the sales of TREHA™ and other food materials (except for Prinova Group) and AA2G™ and other cosmetics-related materials. The decline was mainly due to a lower demand

Net Sales by Segment (100 millions of yen)

Change in Net Sales by Segment (100 millions of yen)

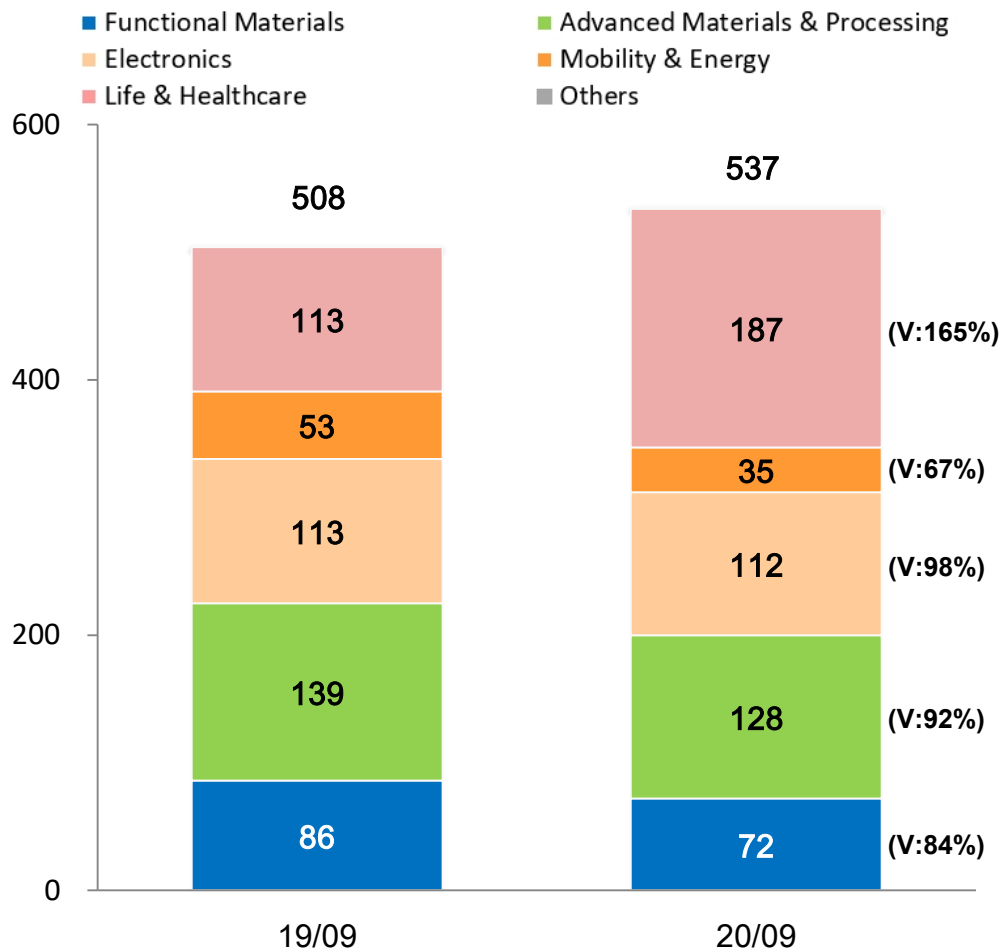


*V: Vs 19/09

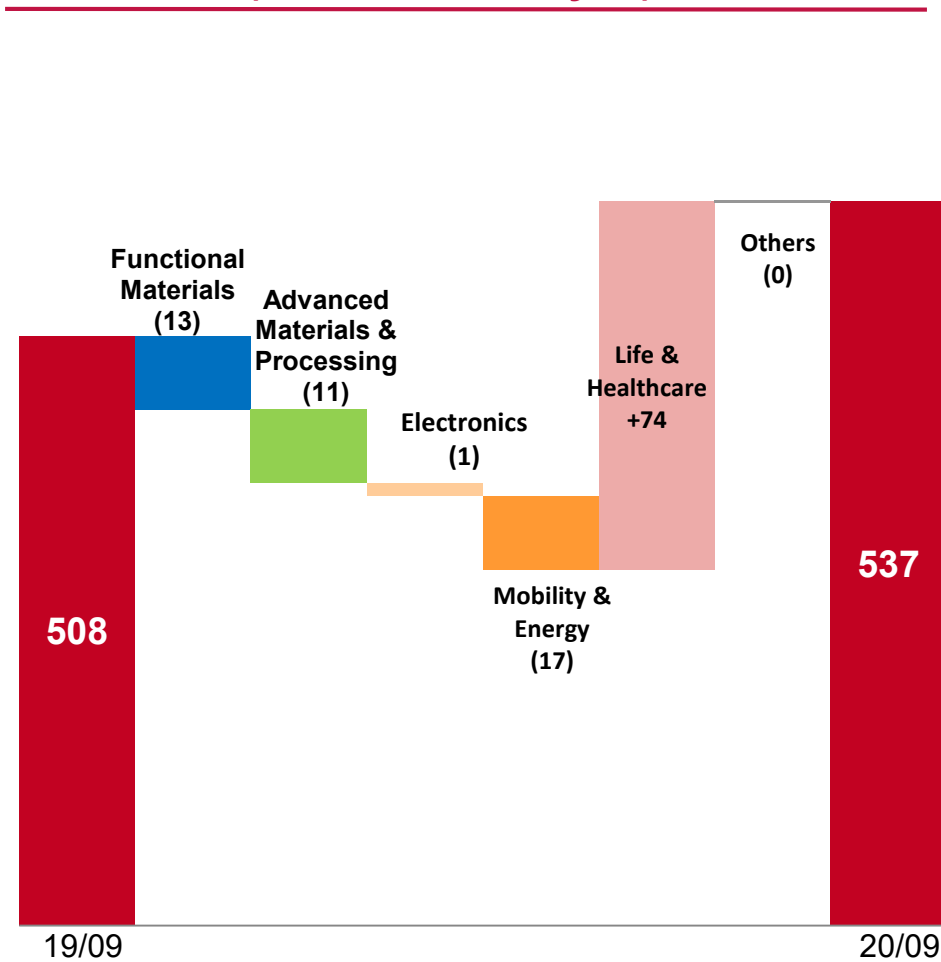
Gross Profit: Two-Year Comparison (by Segment)

- Profit increased as a result of the high profitability of the Prinova Group exceeding the impact of the Company's sales decrease

Gross Profit by Segment (100 millions of yen)



Change in Gross Profit by Segment (100 millions of yen)



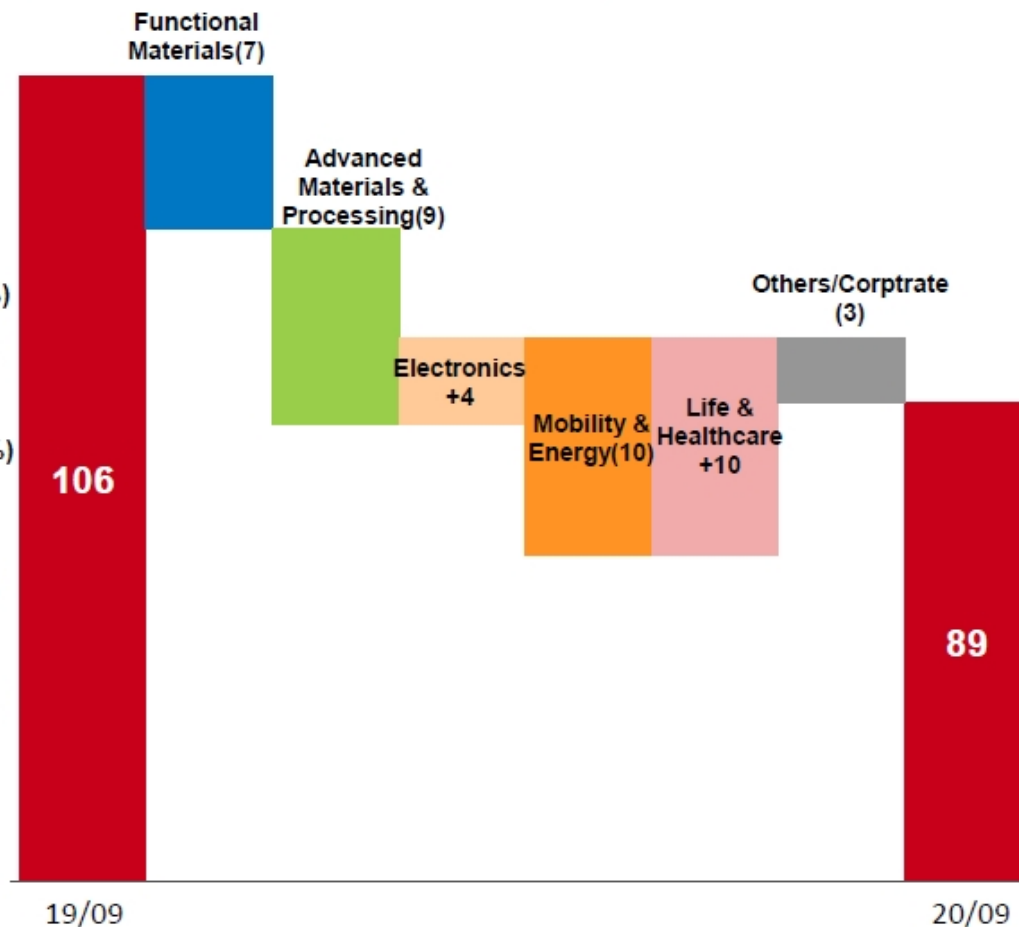
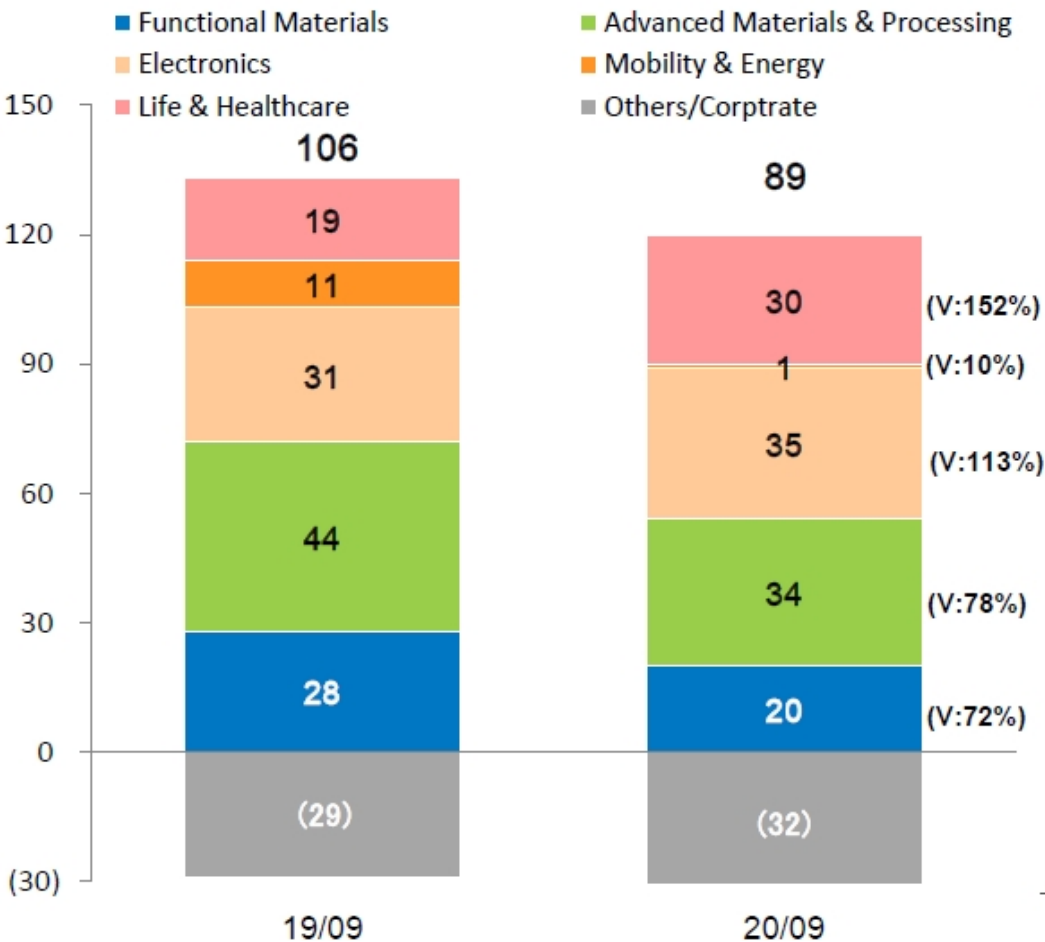
*V: Vs 19/09

Operating income: Two Year Comparison (by Segment)

- **Advanced Materials & Processing:** Lower profits due to declining sales and degraded market conditions in the digital print processing materials business
- **Electronics:** Despite reduced sales, increased profitability in certain manufacturing subsidiaries led to higher profit

Operating income by Segment (100 millions of yen)

Change in Operating income by Segment (100 millions of yen)



*V: Vs 19/09

Earnings at Major Consolidated Subsidiaries

- Nagase Plastics Co., Ltd.: Sales and profits declined due to impact from the COVID-19 pandemic driving down sales of resins for the office equipment, appliance, and electronics industry
- Shanghai Nagase Trading Co., Ltd.: Sales and profits increased as Greater China overall shook off the impact of the COVID-19 pandemic at an early stage, with electronics-related and other businesses, primarily semiconductors, trending strongly

(100 millions of yen)

Company Name		Net sales	Vs. PY	Operating Income (Note 2)	Vs. PY
Manufacturing Companies	HAYASHIBARA CO., LTD.	114	89%	21	80%
	Nagase ChemteX Corporation	120	92%	14	108%
	Total for manufacturing (Note 1)	466	89%	45	77%
Domestic Sales Companies	Nagase Plastics Co., Ltd.	151	80%	3	56%
	Nagase Chemical Co., Ltd.	77	80%	1	77%
	Nishinihon Nagase Co., Ltd.	25	60%	0	45%
	Total for domestic sales (Note 1)	376	80%	10	71%
Overseas Sales Companies	Prinova Group, LLC	444	-	25	-
	Shanghai Nagase Trading Co., Ltd.	218	101%	6	187%
	Shanghai Hua Chang Trading Co., Ltd.	192	97%	6	120%
	Total for overseas sales (Note 1)	2,128	115%	66	169%

Note 1: Totals for each category are the simple sums of each company in the category. These sums do not equal consolidated figures.

Note 2: Operating income does not reflect amortization of goodwill and depreciation of technology-based assets.

State of Two Major Manufacturing Subsidiaries

- Hayashibara Co., Ltd.: Recorded lower sales and profits. Though sales increased for pullulan, a product for the medical and health food industry, and for Fibryxa™, a high-function material for the food industry, impact from the spread of the COVID-19 pandemic led to falling sales in Japan and overseas of TREHA™, a product for the food industry, and AA2G™, a product for the cosmetics industry
- Nagase ChemteX: Recorded higher profits. Despite a decrease in sales, particularly in the Performance Chemicals Business driven by factors such as impact from the spread of the COVID-19 pandemic, operating income rose thanks to improved product mix, cost reductions, and other factors

Hayashibara Co., Ltd.

(100 millions of yen)

	19/09	20/09	Change	Vs. PY
Net sales	129	114	(14)	89%
Operating income	26	21	(5)	80%

- TREHA™ continued to perform well for some food products due to increased stay-at-home demand, but overall performance was sluggish due to a decrease in demand for souvenirs and the food service industry
 - AA2G™ performance remained sluggish due to a decrease in demand in the cosmetics industry
 - Fibryxa™ performed strongly with new adoptions of the product in the food industry
 - Performance was strong for pullulan used in hard capsules for medical and health food products
- ⇒ New wing completed in September, increasing manufacturing capacity

Nagase ChemteX Corporation

(100 millions of yen)

	19/09	20/09	Change	Vs. PY
Net sales	131	120	(10)	92%
Operating income	13	14	+1	108%

- Though the Epoxy Resin Business showed sluggish performance in light electrical applications, primarily for automotives, it showed strong performance in electronic components used for mobile devices
- In the Photolithography Materials Business, though impact from COVID-19 led to temporary reduction in capacity utilization, it is showing gradual recovery
- The Performance Chemicals Business showed sluggish performance in epichlorohydrin conductors for automotive applications and the conductive materials business for the LCD industry
- The Bio Chemicals Business showed strong performance
- Profit was higher due to factors such as improved product mix and cost reductions

- Though the Armada Business for the sports nutrition market showed sluggish performance because of impact from the COVID-19 pandemic, sales grew for vitamins and other food materials, leading to strong performance overall

	FYE March 2021 First Half (January-June performance)	*Reference FYE December 2019 (full year) (excluding special M&A-related expenses)
Prinova Group net sales	¥44.4 billion	Approx. ¥82.0 billion
Prinova Group operating income	¥2.5 billion	Approx. ¥4.0 billion
Amortization of goodwill and other intangible assets	¥0.9 billion	(Reference) FYE March 2020: ¥0.8 billion in amortization over five consecutive months

- The Ingredients Distribution Business and the Solutions (formulating/processing) Business showed strong performance with increased health maintenance consciousness due to the COVID-19 pandemic and recovery in market conditions, leading to increased sales in vitamins and other food materials-related areas
- However, the Armada Business (contract manufacturing) showed sluggish performance, with demand falling due to COVID-19 pandemic-driven sports gym closures, sports event cancellations, and so on

Consolidated Balance Sheets

- Assets decreased ¥9.3 billion due to decreases in cash and deposits, accounts receivable, etc.
- Liabilities decreased ¥26.5 billion due to decreased commercial paper and accounts payable
- Shareholders' equity ratio rose 3.7 points to 53.6%

Assets

Liabilities and Net Assets

(100 millions of yen)

	20/03	20/09	Change
Total current assets	3,793	3,540	(252)
Cash and time deposits	514	378	(135)
Notes and accounts receivable	2,211	2,094	(116)
Inventories	956	949	(7)
Other	111	117	+ 6
Total non-current assets	2,321	2,480	+ 159
Property, plant and equipment	743	756	+ 13
Intangible fixed assets	725	690	(35)
Investments, other assets	852	1,034	+ 181
Investments in securities	761	941	+ 180
Other	91	92	+ 1
Total assets	6,114	6,021	(93)

	20/03	20/09	Change
Total current liabilities	2,004	1,715	(289)
Notes and accounts payable	1,082	984	(98)
Short-term loans and current portion of CP	618	444	(174)
Other	302	286	(16)
Total long-term liabilities	978	1,002	+ 24
Long-term loans and Bonds	726	694	(32)
Net defined benefit liability	136	139	+ 2
Other (Deferred tax liabilities, etc.)	115	168	+ 53
Total liabilities	2,982	2,717	(265)
Total net assets	3,132	3,304	+ 171
Shareholders' equity	2,723	2,798	+ 74
Accumulated other comprehensive income	329	426	+ 96
Net unrealized holding gain on securities	326	435	+ 109
Translation adjustment	10	(4)	(15)
Other	(6)	(4)	+ 2
Non-controlling interests	79	79	+ 0
Total liabilities and net assets	6,114	6,021	(93)

Consolidated Cash Flows

Cash Flows

(100 millions of yen)

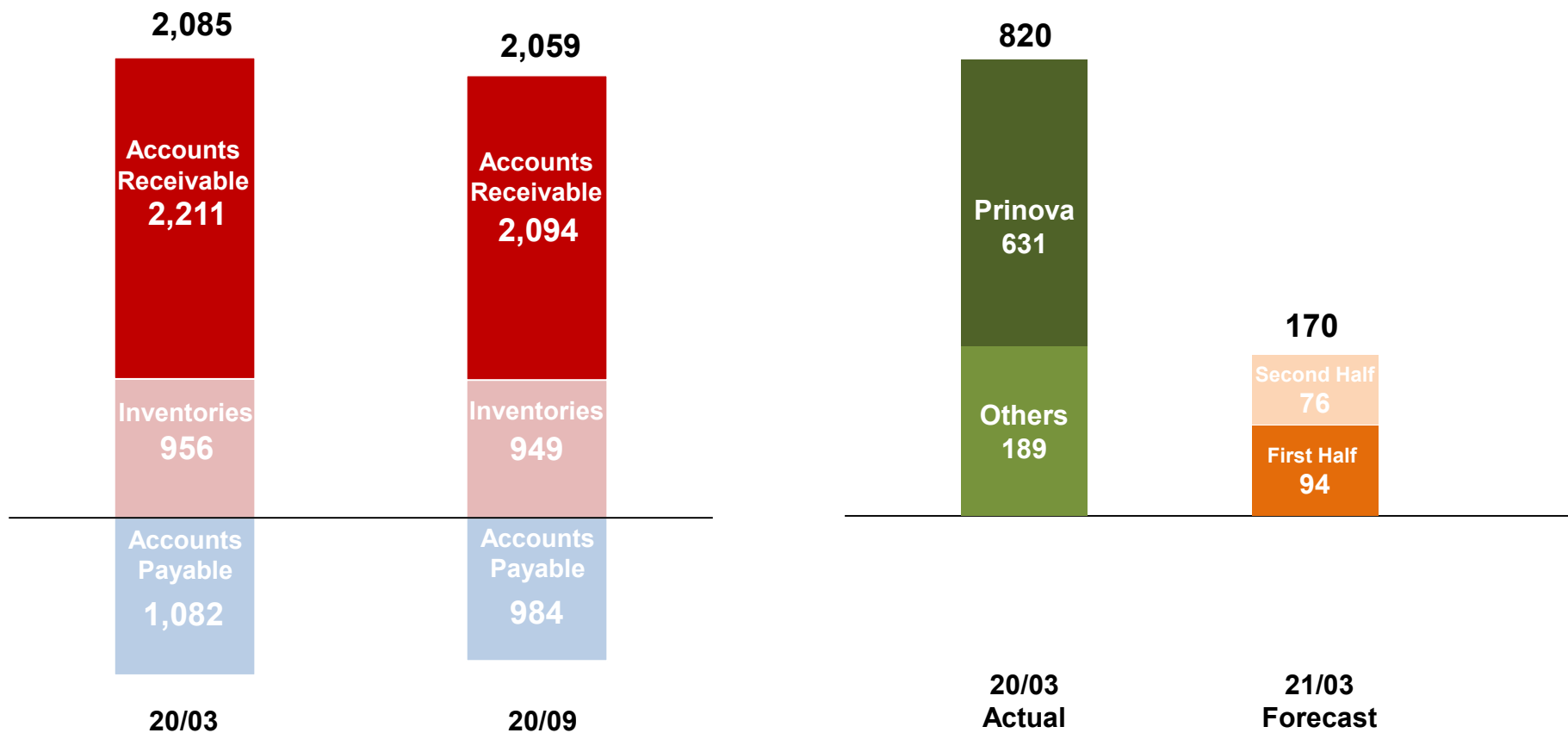
	20/09	Main factors	19/09
Net cash provided by (used in) operating activities	132	Profit before income taxes +151 Depreciation and amortization/amortization of goodwill +66 Change in working capital +22 Income taxes paid (53)	124
Net cash provided by (used in) investing activities	(25)	Purchases of tangible and intangible fixed assets included in other assets (55) Purchases of investments in securities (30) Proceeds from sales of investments in securities +57	(478)
Net cash provided by (used in) financing activities	(236)	Decrease in commercial paper (200) Decrease in short-term loans (38) Cash dividends paid (27)	394
Effects of exchange rate changes on cash and cash equivalents	(4)		(23)
Net increase (decrease) in cash and cash equivalents	(134)		17
Cash and cash equivalents at beginning of the year	504		440
Cash and cash equivalents, at end of the period	370		457

Working Capital and Investments

- Working Capital: Continued thoroughgoing management to adjust inventory, inventories were in decline
- Investments: Made investments primarily related to focus areas Life & Health Care and Electronics
Completed P Wing at Hayashibara Co., Ltd., where enzymes and pullulan are manufactured

Working Capital (100 millions of yen)

Investment (100 millions of yen)



■ FYE March 2021 Earnings Projections

FYE March 2021 Earnings Projections

- In the first half, earnings were better than our previously announced forecasts, in part because economic activity resumed faster than expected in Greater China and there was a temporary increase in demand caused by supply uncertainty attributable to the spread of the COVID-19 pandemic
- On the other hand, we see the COVID-19 pandemic continuing to grow worldwide, so we anticipate that the shift to full-fledged recovery will be in the fiscal year ending March 2022 or thereafter
⇒We have selected a more conservative macroeconomics in the second half
- Furthermore, in the second half, we anticipate that costs for sustained growth, including investment, will be greater than in the first half
- Based on the above, we forecast lower sales and profits overall (there are no changes to the earnings forecasts released in May 2020)

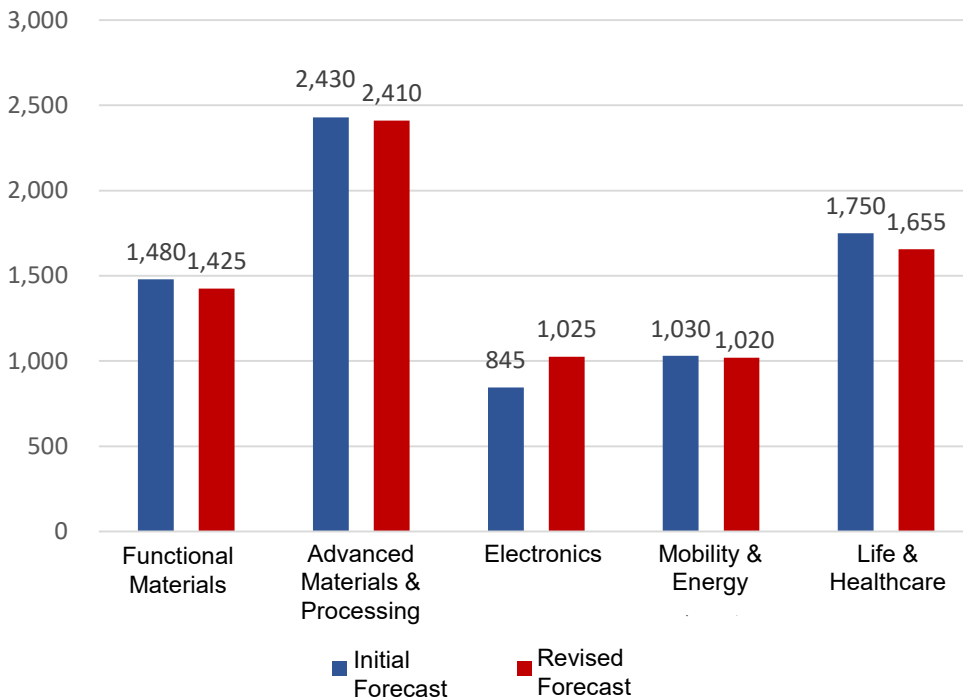
(100 millions of yen)

	20/03 Actual	21/03 Full Year Forecast	Change	Vs.PY
Net sales	7,995	7,540	(455)	94%
Gross profit	1,049	1,070	+21	102%
<GP ratio>	13.1%	14.2%	+1.1%	—
SG&A expenses	857	920	+63	107%
Operating income	191	150	(41)	78%
Ordinary income	190	155	(35)	81%
Profit attributable to owners of the parent	151	125	(26)	83%
US\$ Exchange rate (period average)	@108.7	@106.0	@2.7 Strong yen	
RMB Exchange rate (period average)	@15.6	@14.7	@0.9 Strong yen	

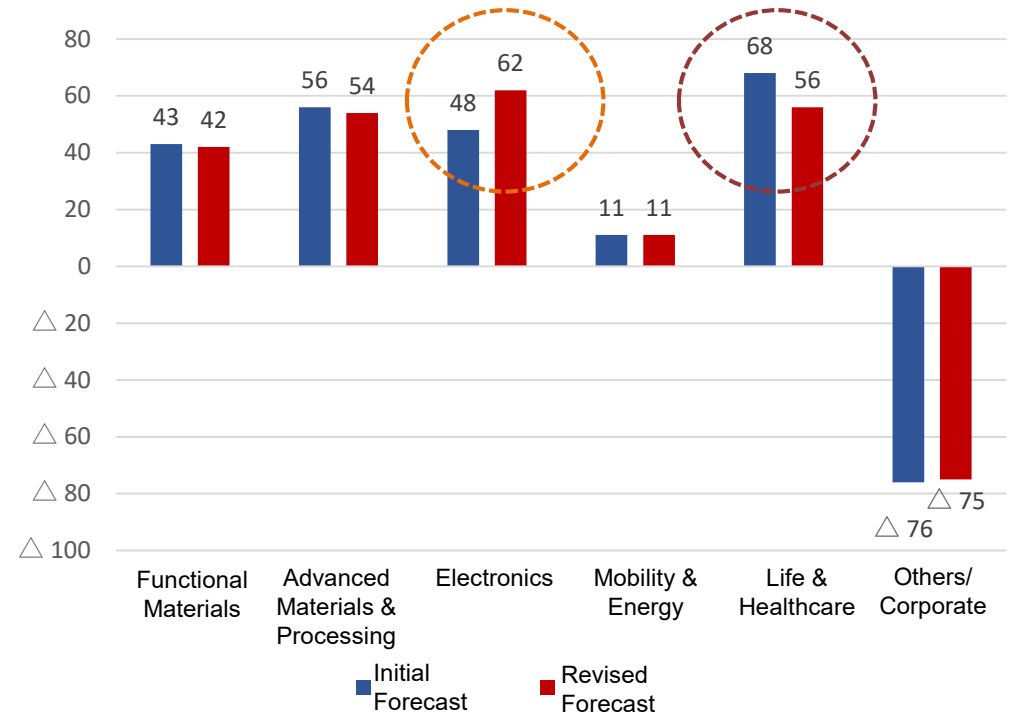
Revised Earnings Projections (by Segment)

- Revised our earnings forecasts for each segment due to variation in market sentiment and current conditions vs. initial expectations
 - As expected, the automotive-related market was in a difficult situation in the first half, but the electronics-related market was stronger than expected
- However, the Life & Healthcare market (e.g. cosmetics) was sluggish

Net Sales Forecast by Segment (100 millions of yen)



Operating Income Forecast by Segment (100 millions of yen)



Electronics

In our environment, demand is rising beyond expectations for notebook PCs, TVs, and other products. Further, the semiconductor market is trending strongly

Life & Healthcare

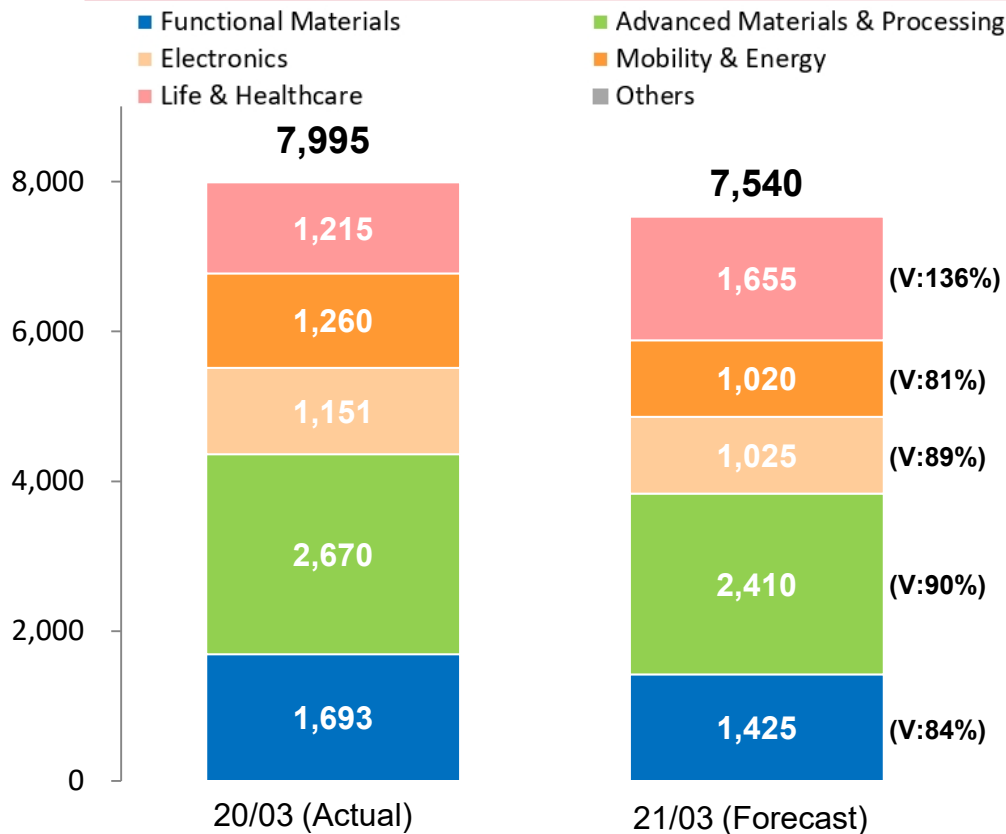
Demand for souvenirs and cosmetics is falling beyond expectations as people's movements are being restricted and inbound demand falls

*There are no changes in the forecast for net sales in Others.

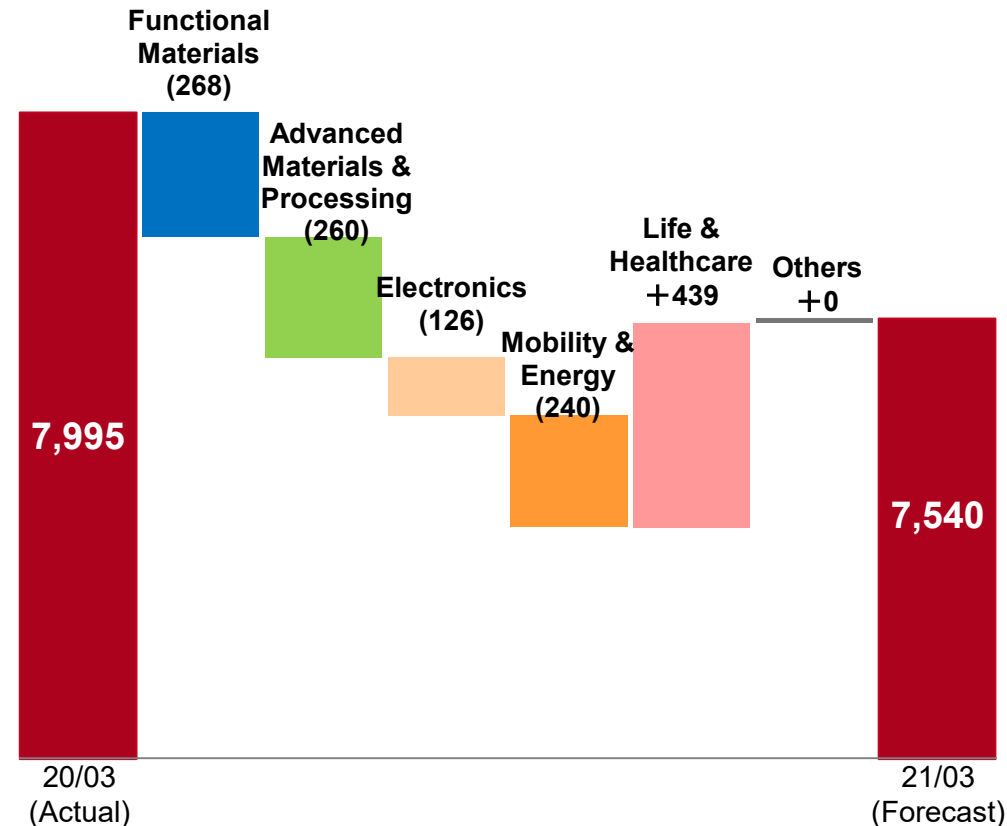
Net Sales Forecast (by Segment)

- **Functional Materials:** Though sales are to recover gradually and end higher versus the first half in coating raw materials and urethane materials thanks to recovery in automotive production in the second half, we forecast a decrease in net sales over the full year
- **Electronics:** Though sales for formulated epoxy resins used in areas such as mobile devices and heavy electrical applications are to trend level versus the first half, given the uncertainty in the market ahead we forecast decreasing sales in display-related products, with net sales down in the second half versus the first, and down for the full year
- **Life & Healthcare:** In the second half, sales of AA2G™ for the cosmetics market and TREHA™ for the food market are expected to remain sluggish and sales are expected to fall versus the first half, we forecast an increase in sales over the full year due to the significant contribution of the Prinova Group consolidation

Net Sales by Segment (100 millions of yen)



Change in Net Sales by Segment (100 millions of yen)

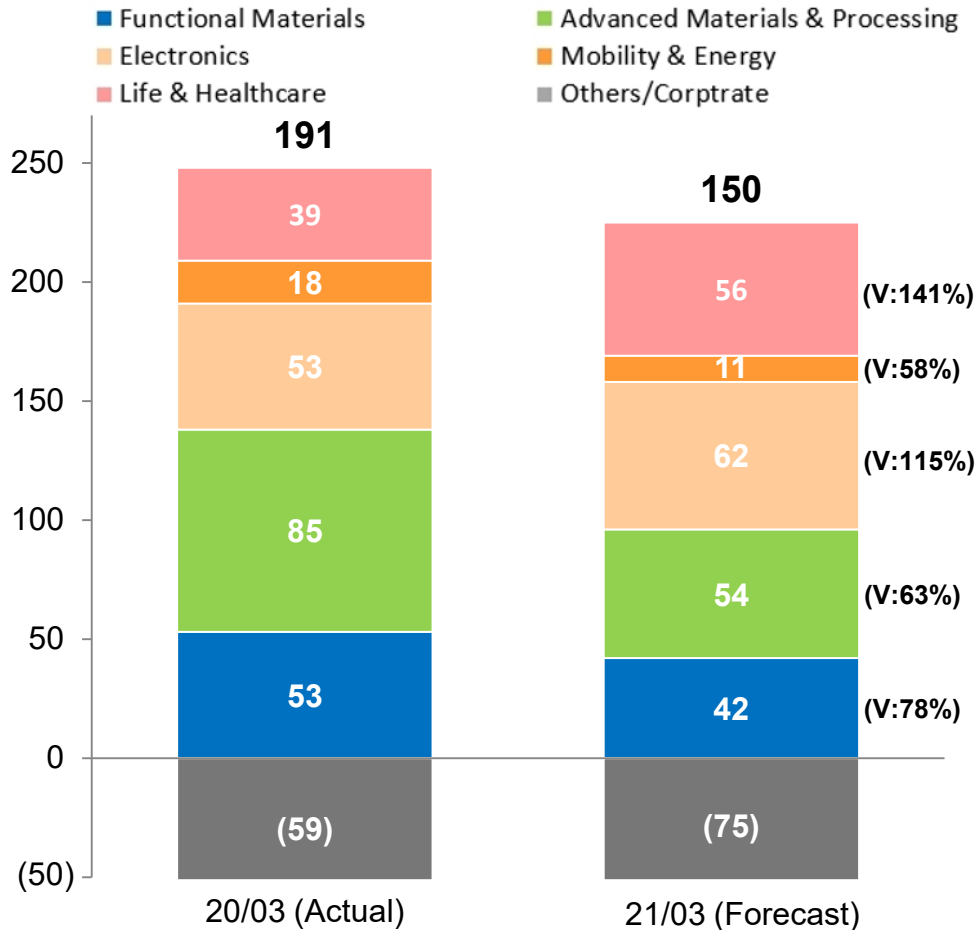


*V: Vs 19/09

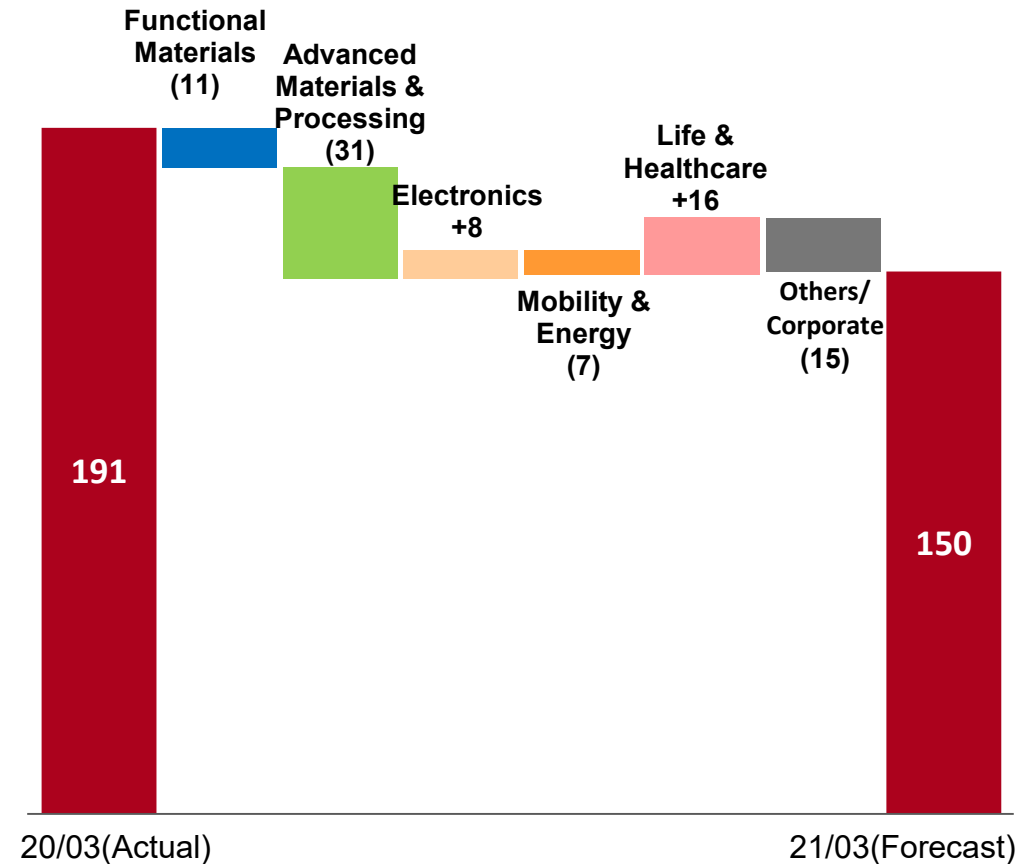
Operating Income Forecast (by Segment)

- **Advanced Materials & Processing:** Lower profits mainly due to degraded profitability driven by declining sales and degraded market conditions in digital print processing materials
- **Life & Healthcare:** Higher profits mainly due to contributions throughout the fiscal year from the Prinova Group
- **Other/Corporate:** Higher costs due to promotion of DX for medium- to long-term growth and acceleration of investment in leading-edge technology

Operating Income by Segment (100 millions of yen)

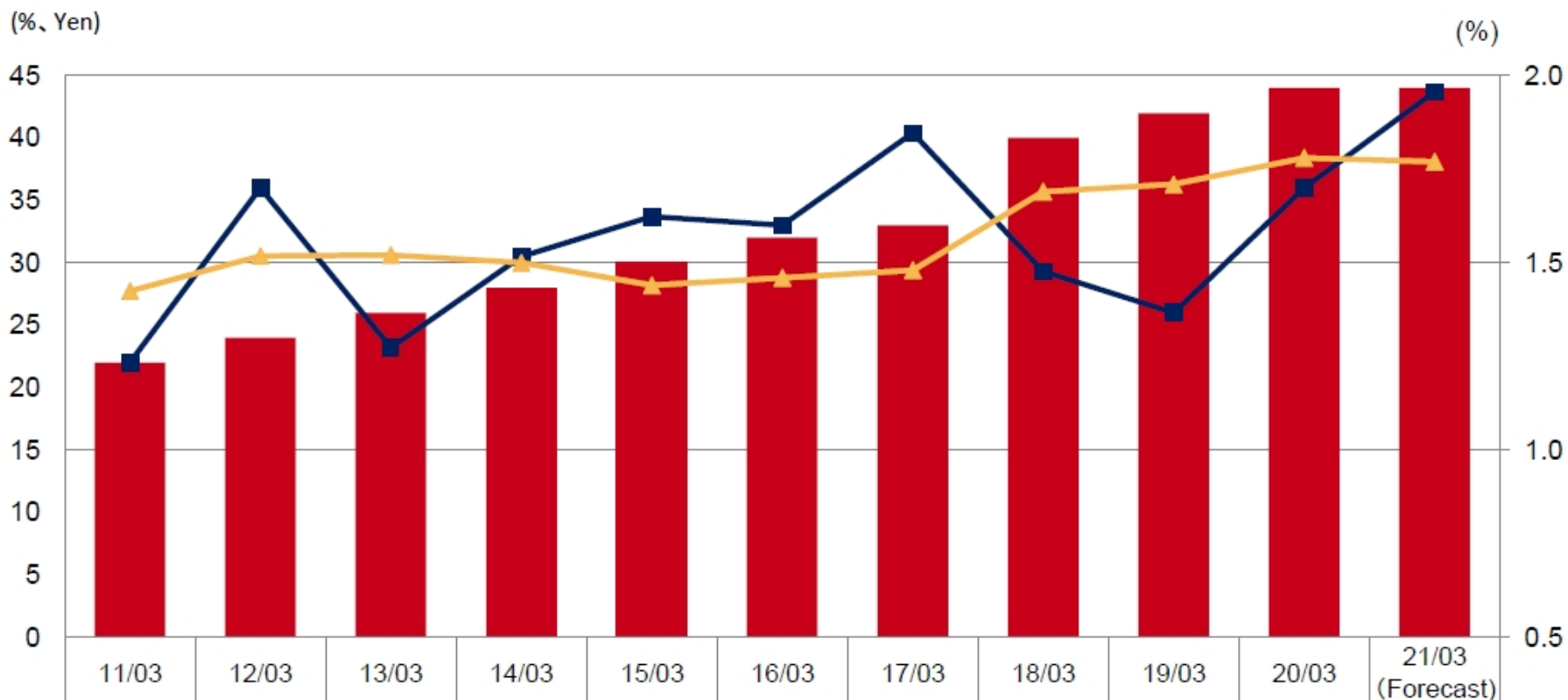


Change in Operating Income by Segment (100 millions of yen)



*V: Vs 19/09

- Expecting to pay dividends of ¥44 per share for the full year, consisting of a ¥22 per share interim dividend and a ¥22 per share year-end dividend



	11/03	12/03	13/03	14/03	15/03	16/03	17/03	18/03	19/03	20/03	21/03 (Forecast)
■ Dividend per Share (left axis)	22	24	26	28	30	32	33	40	42	44	44
■ Payout Ratio (left axis)	22.0	36.0	23.2	30.5	33.7	33.0	40.4	29.3	26.0	36.0	43.7
▲ DOE (right axis)	1.42	1.52	1.52	1.50	1.44	1.46	1.48	1.69	1.71	1.78	1.77

*1 FYE March 2018 dividends include a special dividend of ¥5 per share.

*2 21/03 yearend dividend to be submitted for approval to the 106th general meeting of shareholders scheduled for June 2021.

Progress of Mid-Term Management Plan *ACE-2020*

Accountability / Commitment / Efficiency



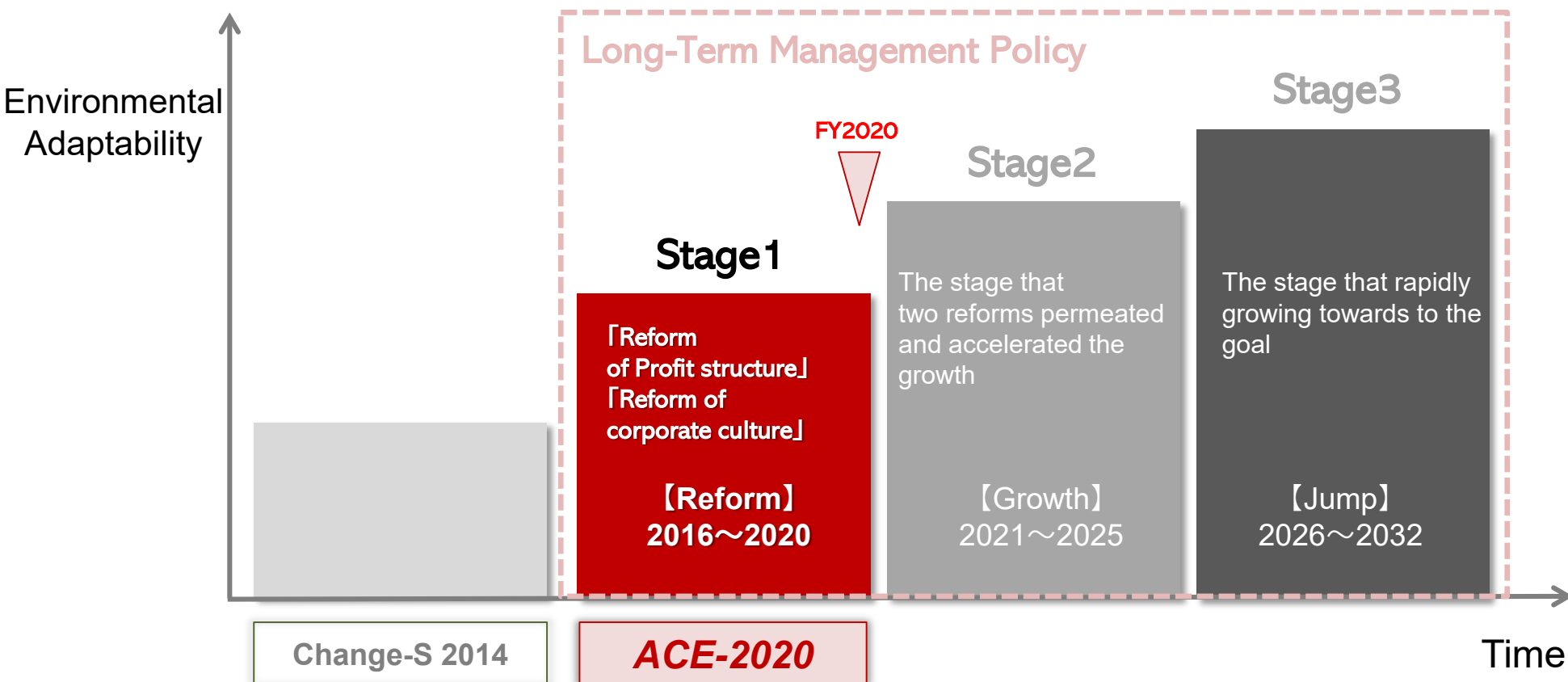
NAGASE Transforms from *Shosha/Trading* to *Business Designer*

Positioning of *ACE-2020*

To achieve our goal by 2032, the last year of Long-Term Management Policy, we divide 17 years of its term into 3 and start stage 1 as the beginning of the Mid-Term management Plan *ACE-2020*.

In FY2020 we will continue the fourth year of *ACE-2020* and continue reforming the business aiming for significant growth.

*Our goal: Normalization of the profit more than tripled.



NAGASE Transforms from “Shosha/Trading” to “Business Designer”.

NAGASE strings all the groups together to create and provide new value to the world through 6 key functions.

Leverage Group functions to achieve the quantitative and qualitative targets.

Reform Profit Structure

Portfolio Optimization

Categorization of business and execution of strategy that matches with the area

Replacement of asset and reallocation of resources

Acceleration in investment that creates core business of group

Expand and Strengthen Revenue Base

Accelerate globalization ” G6000”
Improve manufacturing profitability

Reform Corporate Culture

Mindset

Breed independence and responsibility

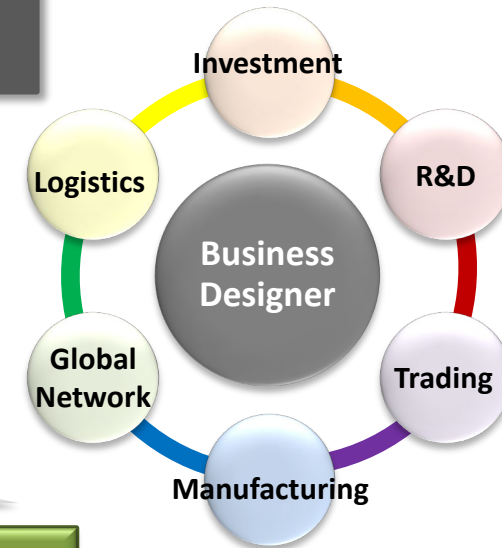
Share the management’s message

Thorough monitoring and PDCA

Strengthen Management Platform

Pursue efficiency

HR development

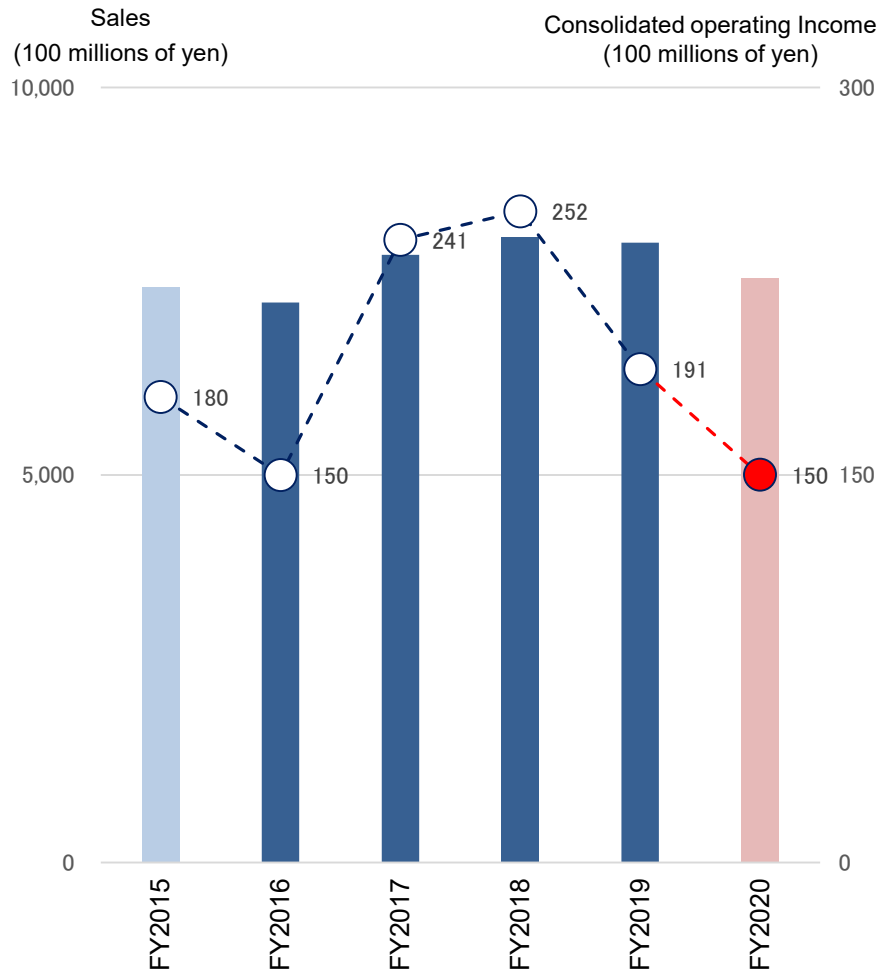


【6 Functions】

Progress of Mid-Term Management Plan *ACE-2020* KGIs NAGASE

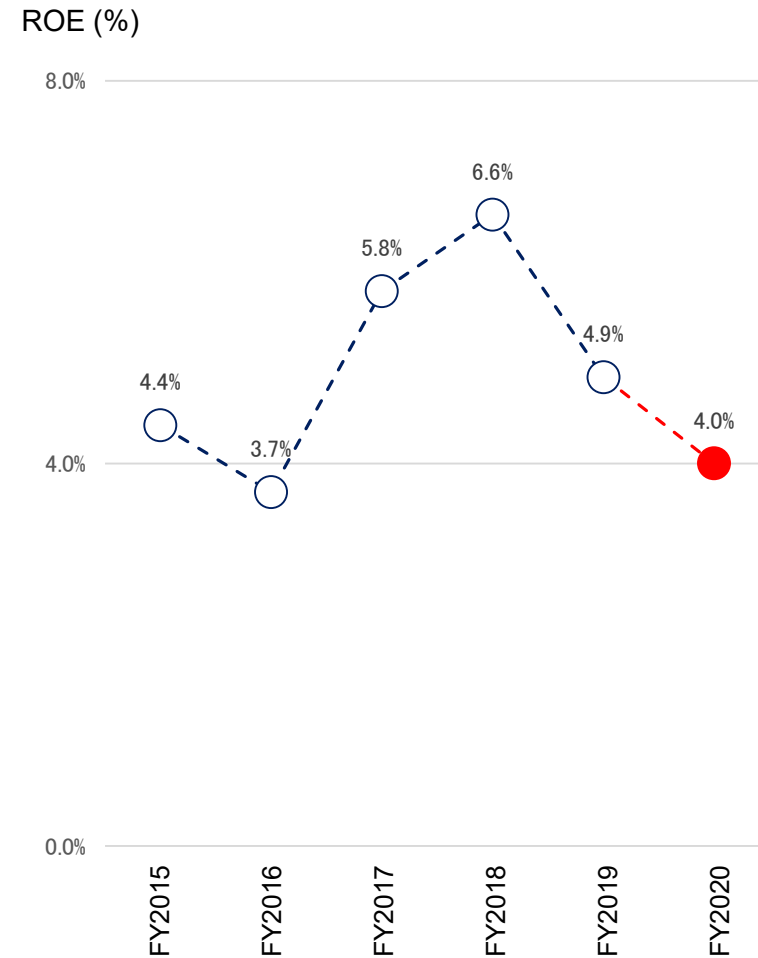
Consolidated Sales/Operating Income

1.0 Trillion Yen/30 Billion Yen or more



ROE

Normalize Over 6% at early stage



Reform of Profit Structure

Focus Area

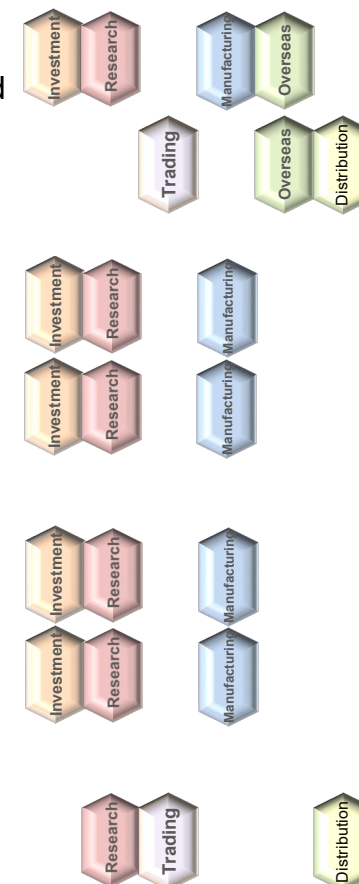
- **Established the Regional Innovation Center, a food materials lab in Singapore.**
Second overseas expansion after Xiamen, China - acceleration of overseas expansion in the food materials field
- **Prinova nominated as sales partner of Emerald Kalama Chemical**
Expansion of sales of flavor and fragrance ingredients in Southeast Asia

Growth Area

- **Launch provision of SaaS services on the TABRASA new material search platform**
Features analytics and cognitive capabilities to explore new materials more efficiently
- **Established business alliance with Karydo TherapeutiX, using AI to predict efficacy and side effects with high accuracy**
AI analysis data of COVID-19 therapeutic drug candidates is provided free of charge to all players in industry, academia, or government
- **Jointly-proposed separation membrane process with Unitika Ltd. selected for NEDO subsidy**
Reduces energy costs in the organic solvent reuse process to less than 1%
- **Named a Zero-Emission Challenge Company by the Ministry of Economy, Trade and Industry**
For development of bio-derived product production technology and high-function product production technology using living organisms

Base Area

- **Launched the Chemical Outsourcing Coordination website and an online customer platform offering antifoaming agent solutions**



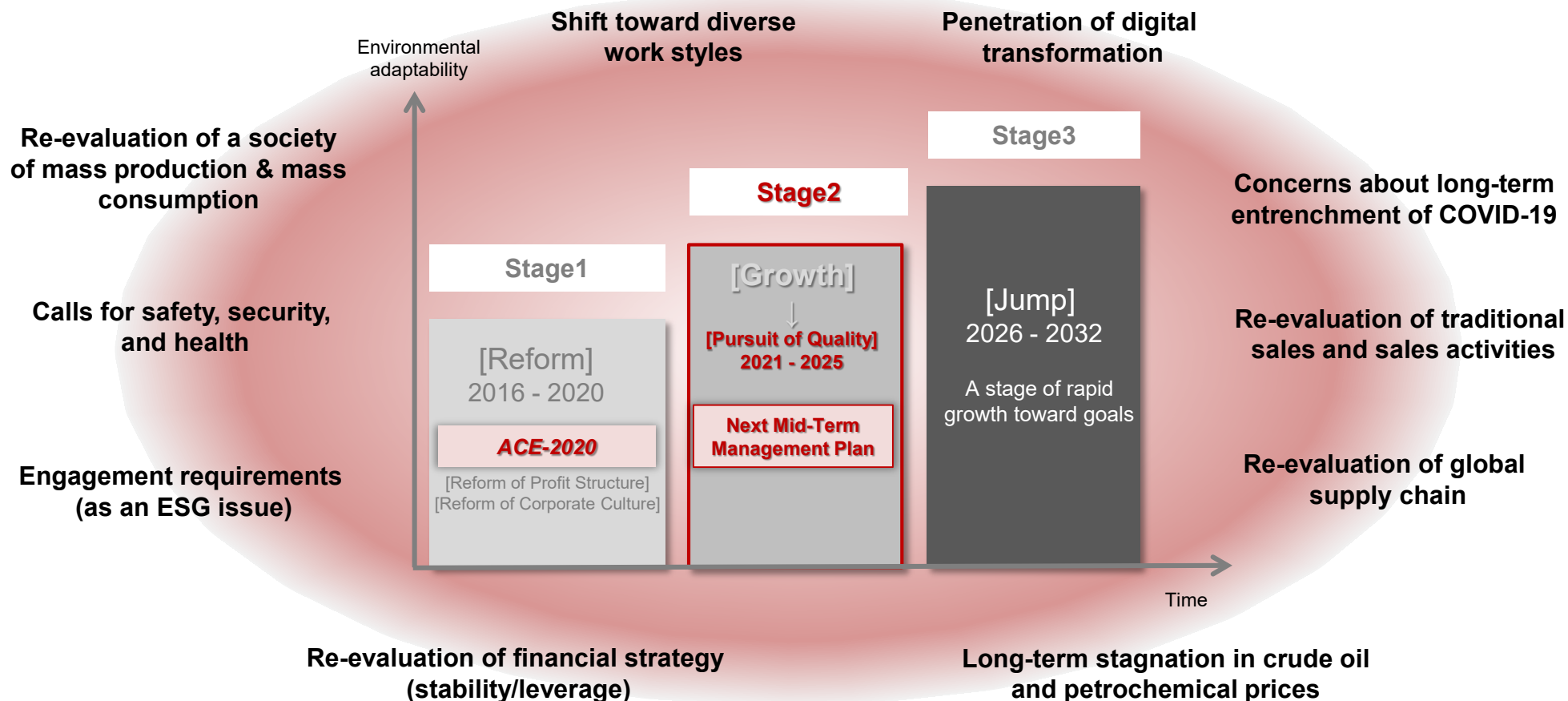
Reform of Corporate Culture

- **Established the Sustainability Committee**
- **Established Nagase & Co. official social media accounts (on Twitter & Facebook)**

Positioning of the Next Mid-Term Management Plan

Positioning change: from a growth period to **Pursuit of Quality**

In recognition of the **dramatic degradation of the external environment** occurring in the final year of Stage 1, we have changed the positioning in Stage 2 from a growth period to *pursuit of quality*. We have positioned this period as one where we create value for our stakeholders in a tangible form (businesses, mechanisms, culture) looking ahead to 2032, and we are working to formulate plans that revolve around **improvement of social and environmental value, leveraging of advanced technology, and improvement of capital efficiency**.

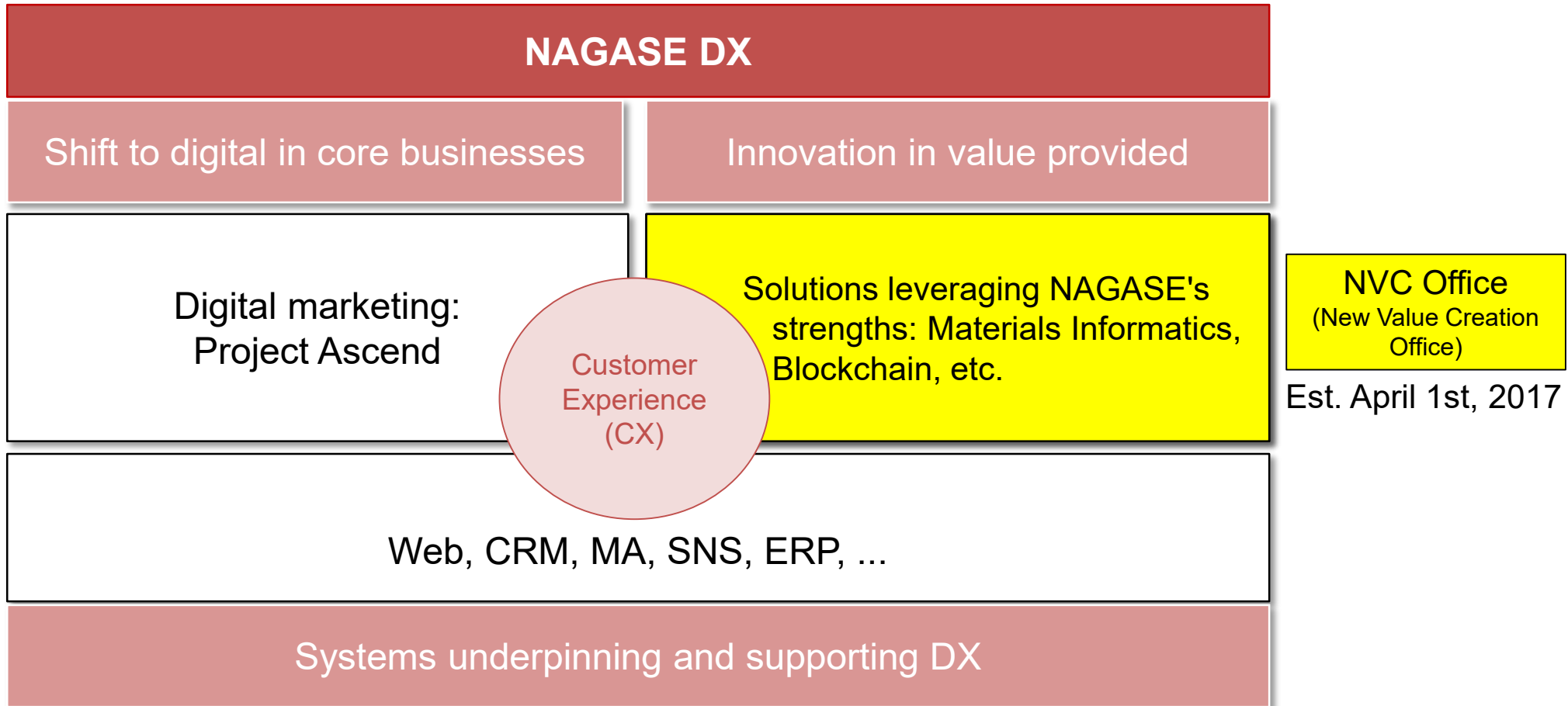


Materials Informatics SaaS Services

Yasumitsu Orii

**Ph.D., Engineering
Executive Officer and General Manager of
the New Value Creation Office**

NAGASE's Digital Transformation (DX) Strategy



Leading-edge materials development technology fusing data processing technology with materials science



×



= Materials Informatics

While attention is being gathered on this technology because of its ability to significantly shorten R&D times, development costs and securing specialized human resources are issues



NAGASE Materials Informatics allows users to utilize cutting-edge MI (materials informatics) services without making initial investments and only incurring running costs



As an industry-standard R&D platform, this will contribute to value creation for our customers

known materials 1,000,000,000

10^9

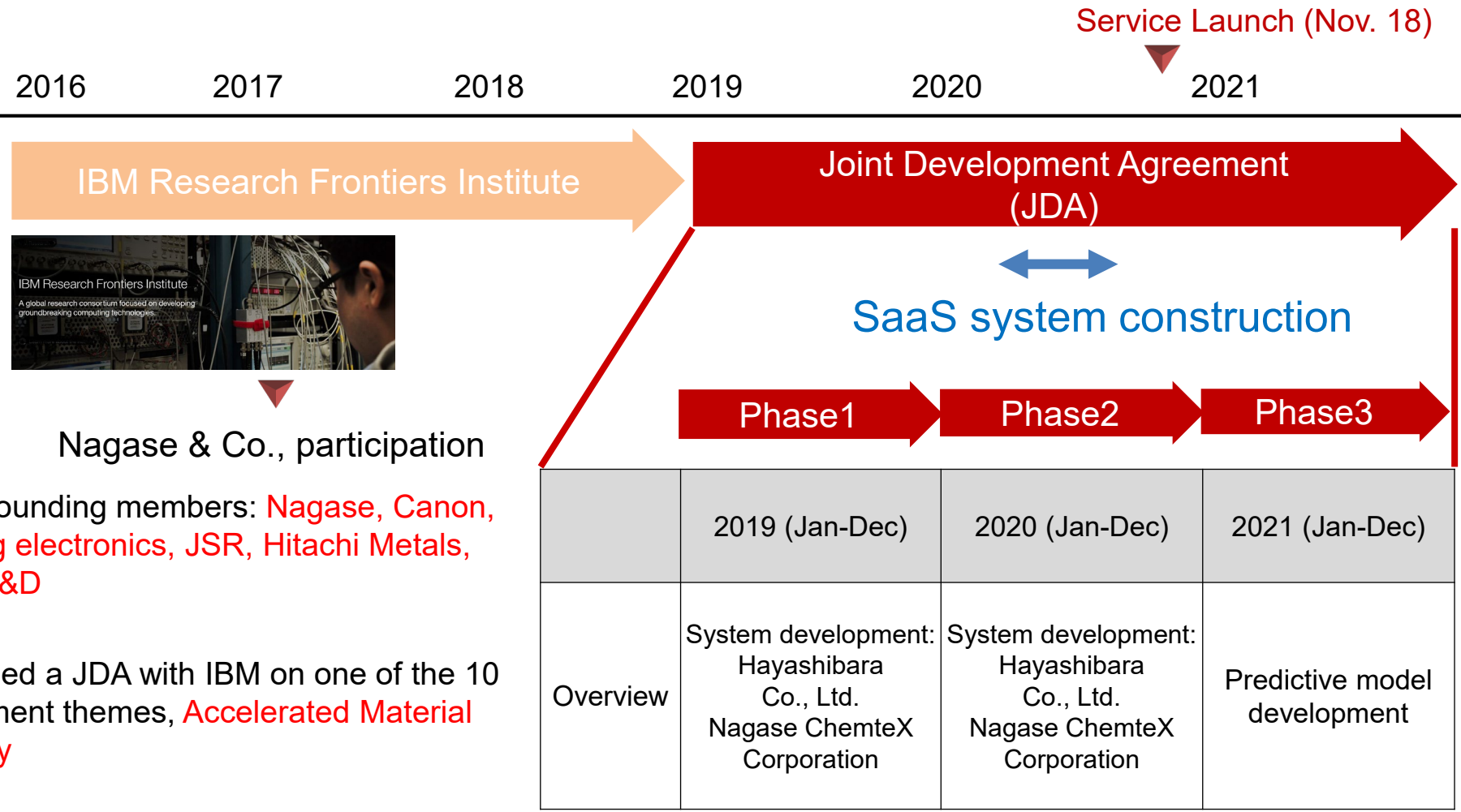
unknown materials

10^{62}

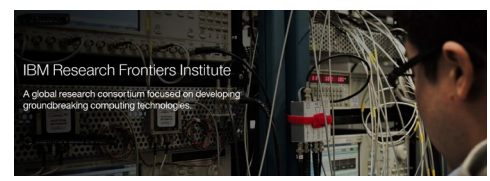
Reference : Kirkpatrick R.S, C.McMartin W.C Guida Chemical Space,
Nature.432(7019):823-865, 2004

Drafted by Takeda, IBM Research - Tokyo, IBM Japan

Background of Materials Informatics System Development



IBM Research Frontiers Institute



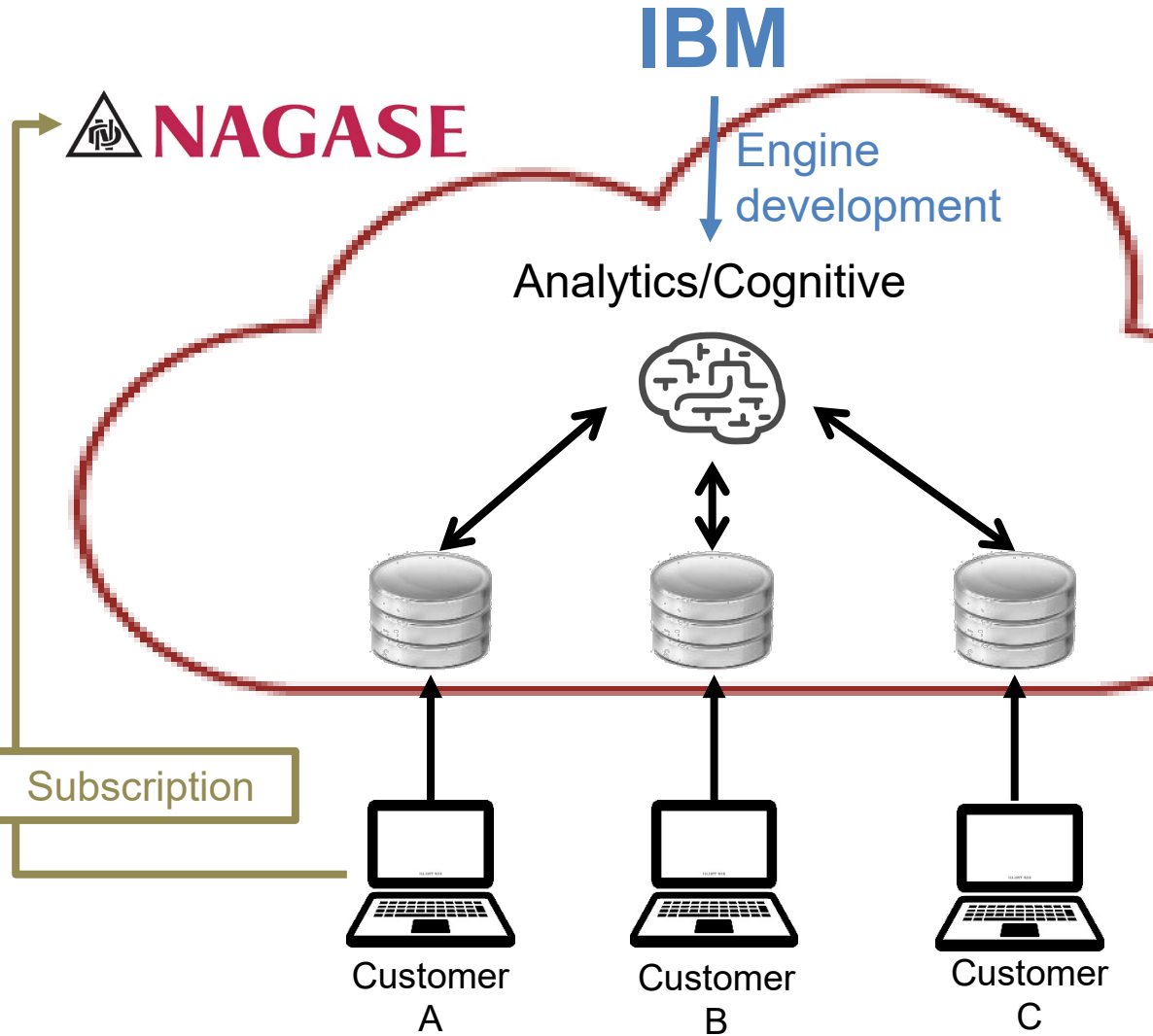
Nagase & Co., participation

Six RFI founding members: Nagase, Canon, Samsung electronics, JSR, Hitachi Metals, Honda R&D

Established a JDA with IBM on one of the 10 development themes, Accelerated Material Discovery

The "SaaS" (Software as a Service) Business Model

The SaaS business model is capable of generating benefits for both customer and operator so long as the operator can continue to provide a high level of service.



Benefits to the customer

IBM-developed engine

Customers continue to enjoy cutting-edge technology

Cloud-based software

Customers can design their own solution without disclosing important customer data to us

Graphical user interface

Enables MI launch without the usual enormous investments (e.g. hiring data scientists)

SaaS usable under a subscription model

Removes need for large-scale systems investment

Benefits to Nagase

Provides outlook for continuous, stable business revenue

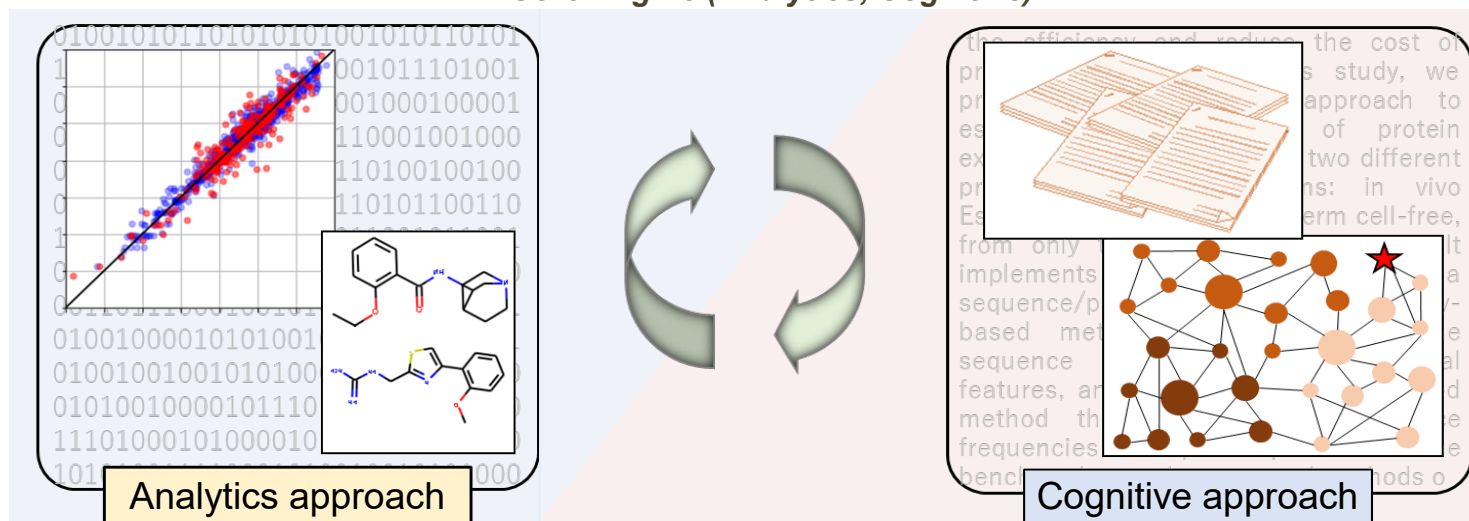
Rapid achievement of a multi-billion yen business
(Annual usage fee × no. of customers)



The NAGASE MI Platform

We provide a development platform offering a comprehensive set of peripheral services, contributing to value creation for our customers

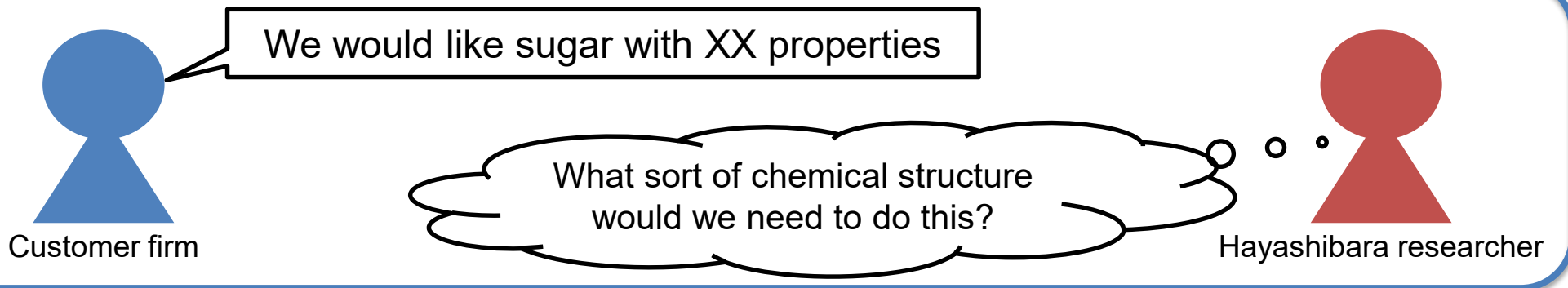
Core Engine (Analytics, Cognitive)



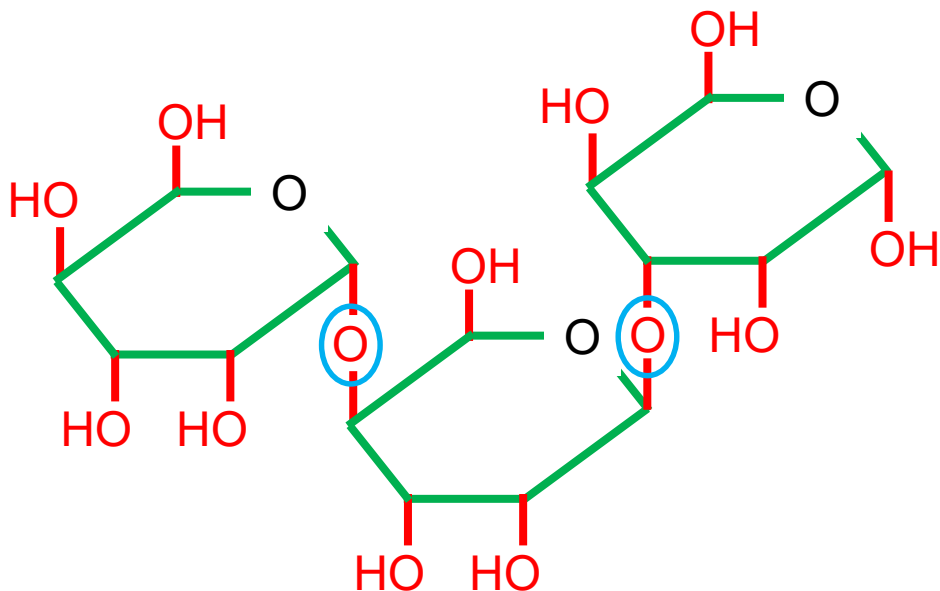
Analytics	Approach	Cognitive
Small molecule structure and physical property values	Input	Documents (papers/technical materials)
Mathematical calculation, machine learning	Method	Language processing, data structuring
Chemical structural formula	Output	New knowledge

Sample Use Case for Analytics

A daily issue at Hayashibara:



Since sugars have many structural variations (theoretically, more than 10 billion), it is very difficult to pinpoint sugars with specific physical property values.



Sample sugar structure (trisaccharide)

Types of sugar structures:

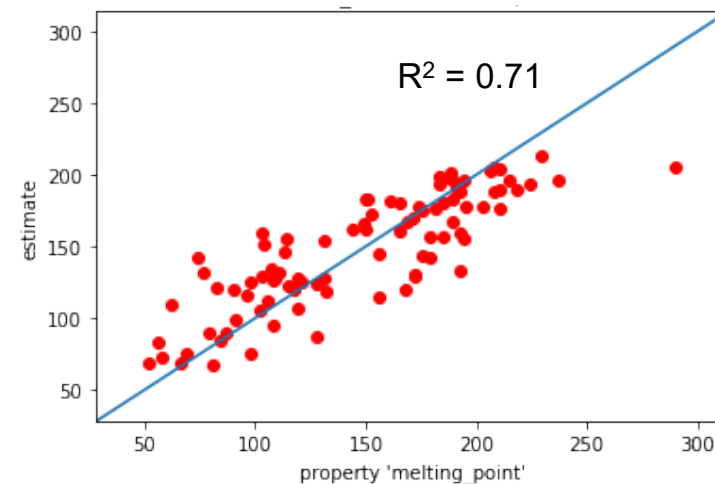
- Permutations of up/down orientation of OH groups:
 $2^5 \times 2^5 \times 2^5 = 2^{15}$
- **Skeleton** types:
Minimum of 8 types per ring
For 3 rings, 8^3
- **Bonding position** between rings:
OH groups: 5 positions x 5 positions x 5 positions = 5^3

Structural variations:

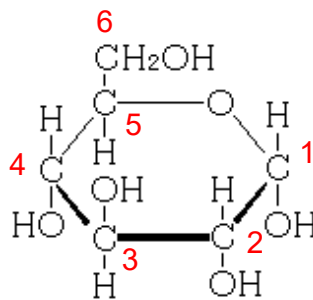
$2^{15} \times 8^3 \times 5^3 =$ over **10 billion possibilities**

Data set

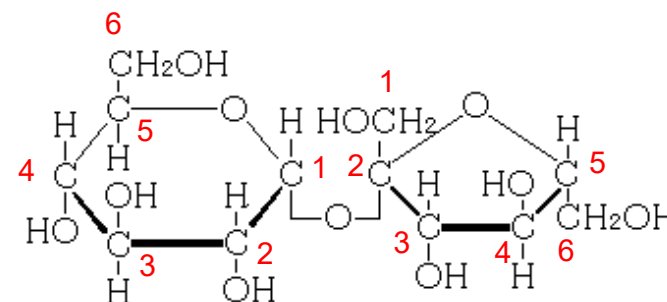
- 153 data points (monosaccharides, disaccharides, trisaccharides)
- Physical property value: Melting point



Basic sugar skeleton

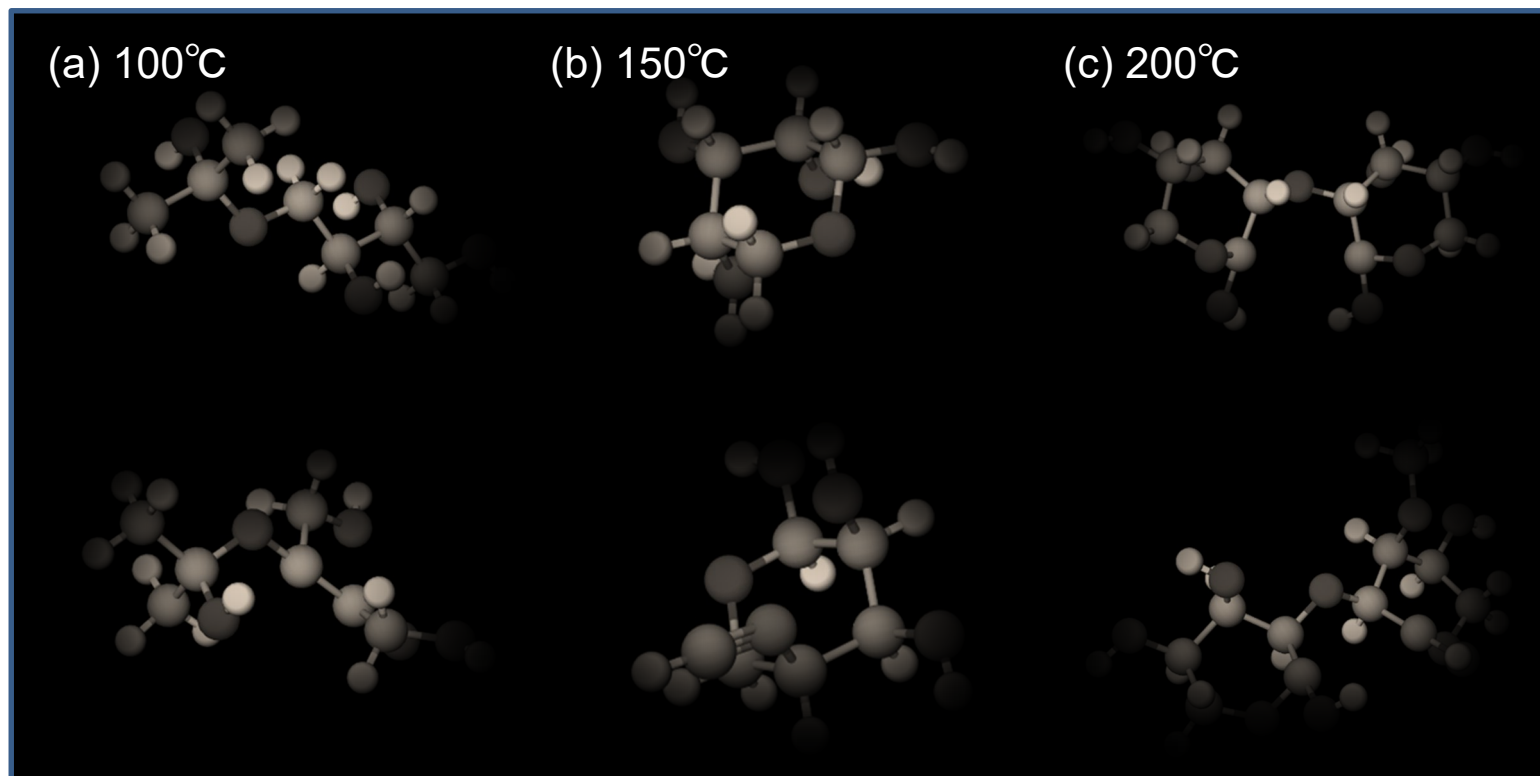


Glucose



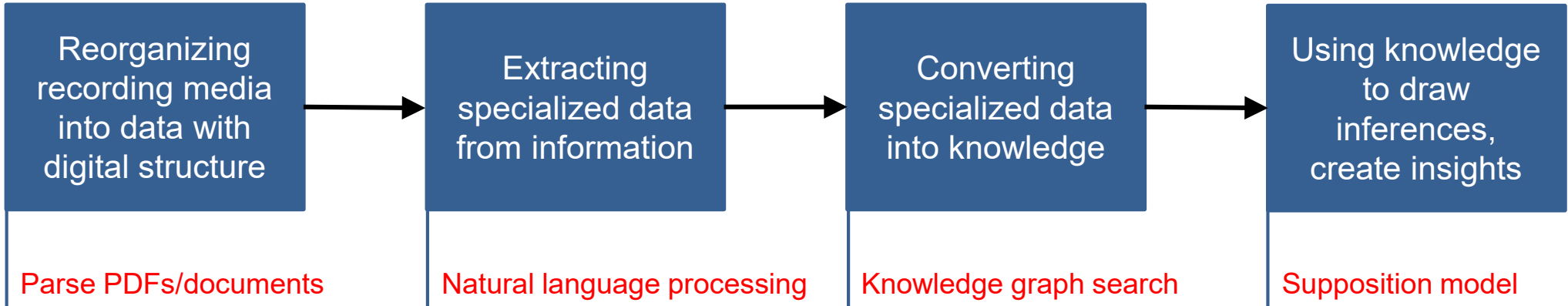
Sucrose

Analytics output



No. of sugar structures discoverable via analytics: 10 per day
(30 times faster than a highly-skilled researcher)

Overview of the Cognitive Approach

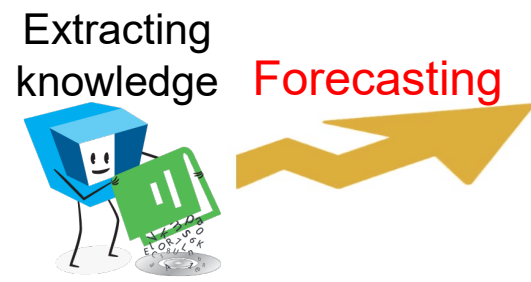
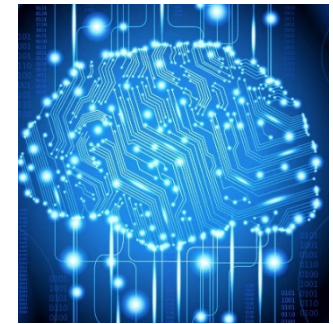
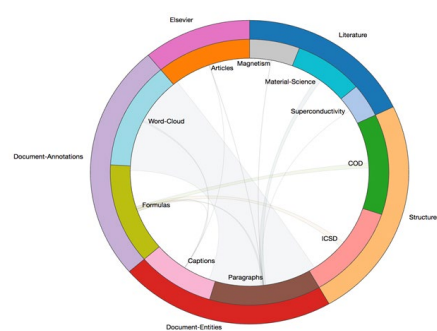


Dividing the large glyoxalase family 13 into subfamilies towards engineered functional annotations of amylose-related proteins

Garnet-type oxides

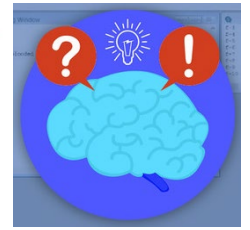
Materials with garnet-like structure have received much attention since Thangarajal et al. reported the successful synthesis of $\text{Li}_{1-x}\text{Mn}_x\text{Fe}_x\text{O}_4$ (M=Fe, Ni) because this class of materials exhibit both relatively high Li^+ conductivity and electrochemical stability towards Li^+ [45]. The $\text{Li}_{1-x}\text{Mn}_x\text{Fe}_x\text{O}_4$ materials are usually crystallized in a cubic phase with the space group of $\text{Fd}\bar{3}m$. Each unit cell includes an excess of 16 Li^+ ions in comparison with the ideal garnet composition. The eight and six coordination sites are occupied by La and M ions, respectively, and the Li^+ ions sit on the six-fold coordination sites. Detailed Li^+ conductivity of polycrystalline materials are synthesized through high-temperature annealing of microcrystalline powders at 600°C for more than ten hours. When the powder sizes are decreased to the values less than 100 nm , the lowest sintering temperature for synthesizing detailed materials can be lowered to 600°C for pure garnet-like $\text{Li}_{1-x}\text{Mn}_x\text{Fe}_x\text{O}_4$ [46]. The lowered temperature helps eliminate the evaporation of lithium, thus lead to an improvement in phase purity. The increased electrochemical stability in comparison with the conventional Li^+ materials has been studied with the first-principles density functional theory [47]. The results indicate that the electrochemical stability of $\text{Li}_{1-x}\text{Mn}_x\text{Fe}_x\text{O}_4$ depends on the composition and crystalline structure. When the cation M has a lower effective ionic charge (i.e., a higher screening constant for an unoccupied orbital), the $\text{Li}_{1-x}\text{Mn}_x\text{Fe}_x\text{O}_4$ materials exhibit higher electrochemical stability against metallic Li . The calculation results agree well with the experimental studies in terms of the increases of Li^+ conductivity and Li^+ intercalation in the crystalline unit cells the linkage of Li^+ octahedral sites strongly influences the electrochemical stability. For instance, in spite of stability of the garnet-type $\text{Li}_{1-x}\text{Mn}_x\text{Fe}_x\text{O}_4$ towards Li metal the perovskite-type $\text{Li}_{1-x}\text{Mn}_x\text{Fe}_x\text{O}_4$ with the same constituent elements is reactive in contact with Li metal due to the coexisting Li^+ octahedral network. The Li^+ conductivity can also be interpreted from the aspect of crystalline structure although the exact mechanism is still unknown. Osawa studied $\text{Li}_{1-x}\text{Mn}_x\text{Fe}_x\text{O}_4$ with neutron diffraction and revealed that Li^+ ions occupy on 80% tetrahedral sites and 40% octahedral sites [48]. The distribution of Li^+ ions among tetrahedral and octahedral sites is sensitive towards the annealing temperature. This special distribution significantly influences the mobility of Li^+ ions within the garnet-type framework structure. The Li^+ ions on the octahedral sites are mobile, while the tetrahedral sites seem to act as Li^+ traps to immobilize Li^+ ions [49].

The $\text{La}_{2-x}\text{Li}_x\text{Fe}_2\text{O}_7$ carbonates/oxides/fluorides invariant lamellar oxides (Li-La, Fe, Nd, Sm, Eu) [50] with the activation energy is higher at low temperature in the derived garnet-type oxides, indicating the introduction of defects for Li^+ trapping. The $\text{La}_{2-x}\text{Li}_x$ ions in the garnet-type $\text{Li}_{1-x}\text{Mn}_x\text{Fe}_x\text{O}_4$ materials can also be substituted by low valence ions of alkaline metals and alkaline earth ions, such as K^+ , Ba^{2+} , Ca^{2+} , and Sr^{2+} [52]. This kind of substitution influences the crystalline lattice parameters and Li^+ conductivity. The maximum Li^+ conductivity has been observed at GLYPH^{TM} 10^{-3} S cm^{-1} at room temperature in barium doped $\text{Li}_{1-x}\text{Mn}_x\text{Fe}_x\text{O}_4$ [52]. 10^{-3} S cm^{-1} (e.g., 10^{-2} S cm^{-1}) ions can be substituted by low valence ions such as 2M^{2+} (e.g., Ba^{2+}) ions. For instance, $\text{Li}_{1-x}\text{Mn}_x\text{Fe}_x\text{O}_4$ exhibit Li^+ conductivity as high as $1.8\text{ GLYPH}^{\text{TM}}$ 10^{-3} S cm^{-1} at 50°C [51]. Such cation exchange provides an efficient way to formulate a large number of possible garnet-type oxides and oxides with high Li^+ conductivity.



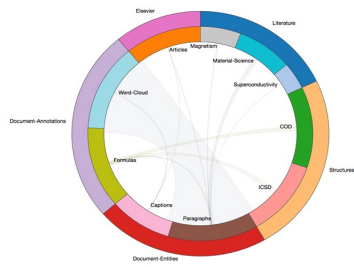
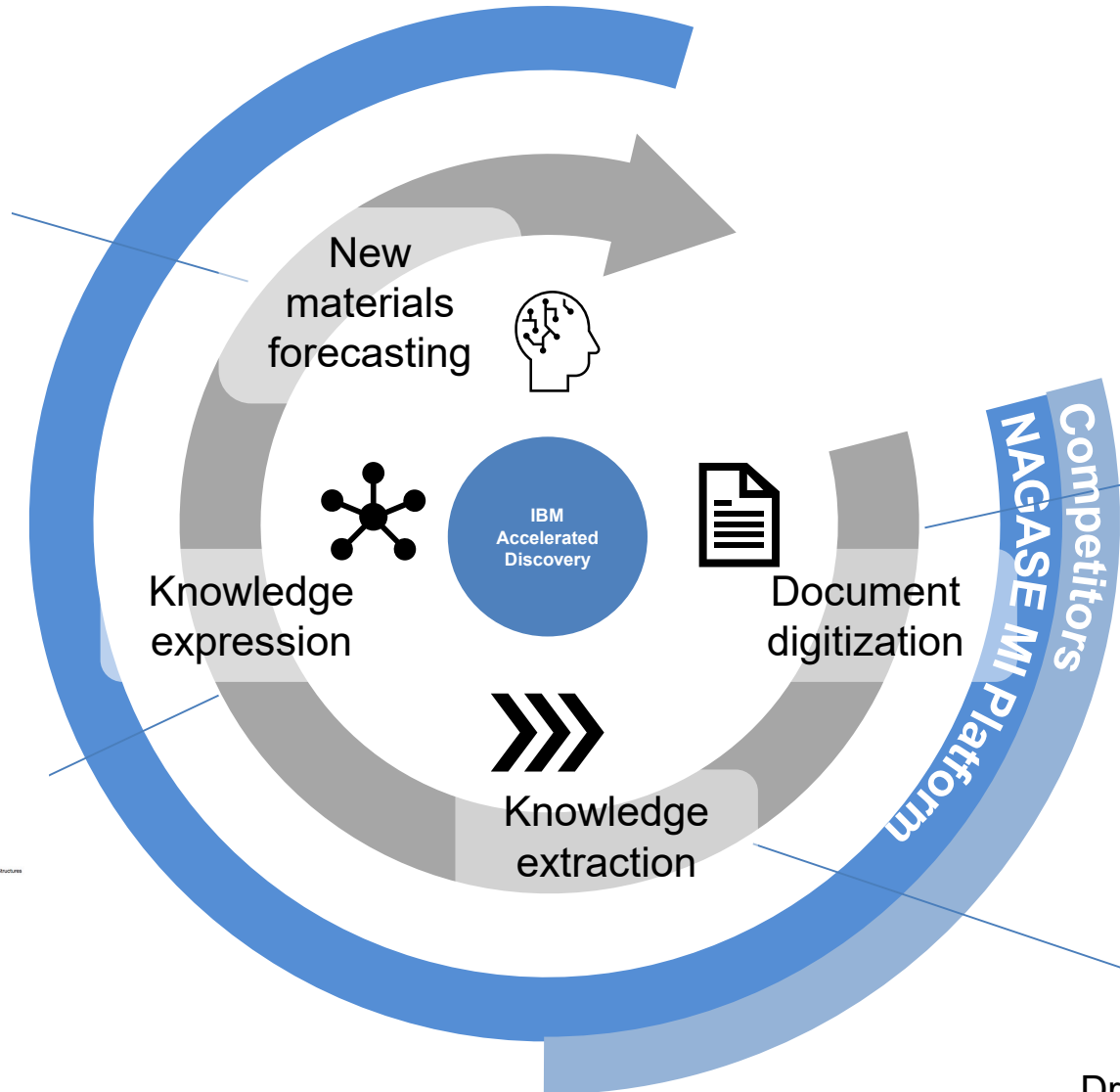
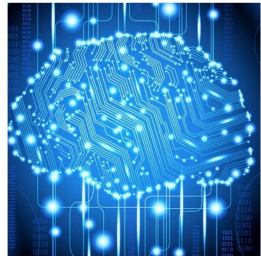
Forecasting

New insights



Characteristics of the Cognitive Approach

World-class AI: State-of-the-art technology drives all processes from knowledge to reasoning



Graphical abstract

During the large glycine hydrochloride family 13 the substitution reveals improved mechanical structures of a superconducting phase

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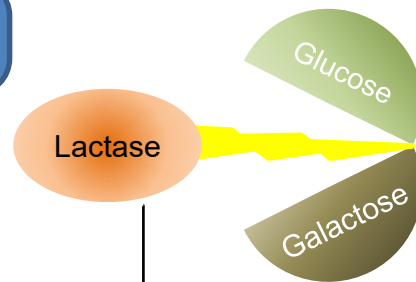
Drafted by IBM Research - Zurich

Sample Use Case for Cognitive

Is it possible to search for an enzyme that reacts with lactose from AI-generated knowledge of enzymes?

Lactose is a disaccharide commonly found in milk and dairy products

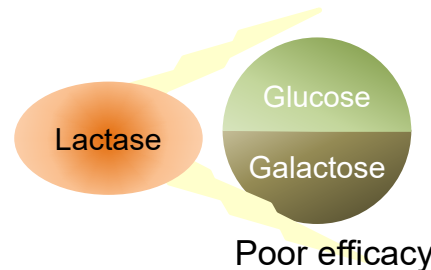
People whose stomachs don't rumble



People whose stomachs rumble

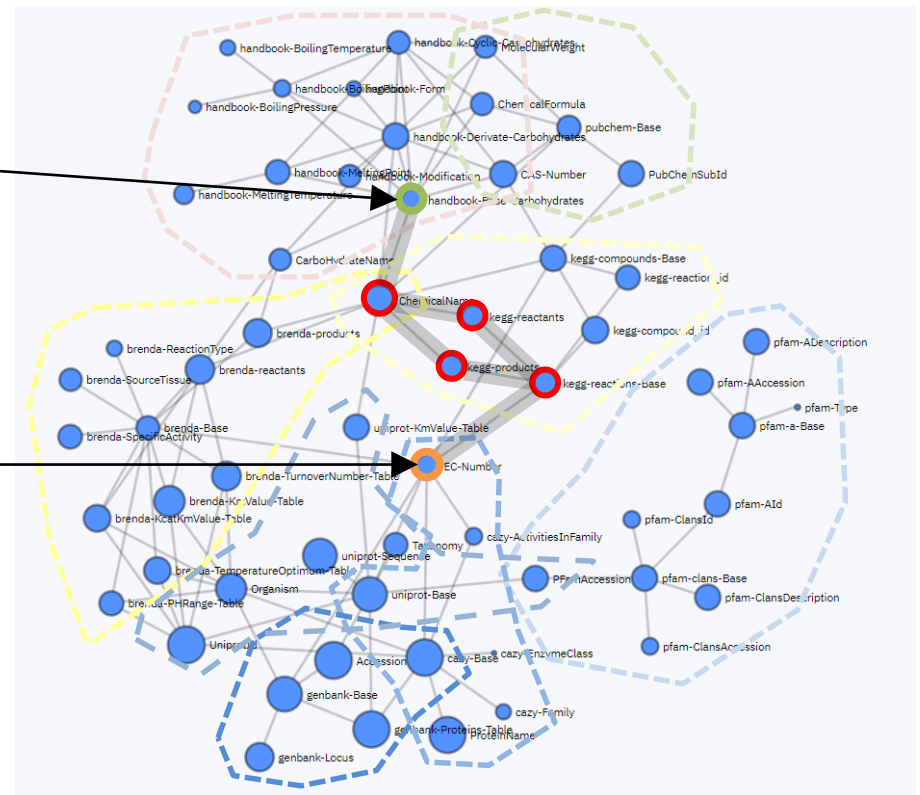


Cause of rumbling stomachs




Poor efficacy

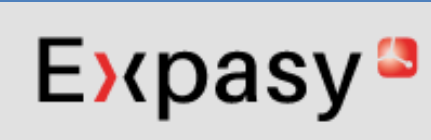
Enzyme knowledge graph



This contains **data from one book and seven public databases**. These represent more than **11,000,000** data points.

Searching for an enzyme that reacts with lactase





Experts search enzyme DB
*The KG does not include Expasy

Enzymes

<input type="radio"/>			Enzyme producing ketones from the reducing end of lactose (1.1.99.13)
<input type="radio"/>		Discovery of new knowledge	Enzyme synthesizing lactose (2.4.1.22)
<input type="radio"/>			Enzyme producing phosphoric acid from lactose (2.7.1.207)
<input type="radio"/>			Enzyme breaking down lactose (3.2.1.23)
<input type="radio"/>			Enzyme breaking down lactose (3.2.1.108)
<input type="radio"/>			Enzyme hydrolyzing the non-reducing ends of oligosaccharides (3.2.1.140)
			Lactase



November 18, 2020
NAGASE & CO., LTD.

NAGASE to Launch SaaS Service Powered by TABRASA New Material Search Platform: Value Provided by Data on Systematic Materials Informatics Knowledge Developed Jointly with IBM Will Accelerate R&D Innovation through Digital Transformation

- NAGASE, a trading company specializing in materials, has launched a cloud-based SaaS service for materials informatics which developed by jointly with IBM.
- The service will achieve an industry first in incorporating two different approaches: in addition to analytics, which are mainstream in materials informatics, it features a cognitive approach enabling more efficient searching for new materials.
- The NAGASE Group will leverage its customer networks to expand provision of the service widely throughout the industry.

MI is a materials development technology that utilizes artificial intelligence (AI) and the latest data processing techniques to efficiently search for new materials. Major materials manufacturers in Japan and abroad have been developing their own MI technology as a way of enabling them to achieve much shorter R&D timelines, but development costs and recruitment of specialist personnel have presented obstacles. TABRASA overcomes such obstacles, since the service is delivered through a SaaS platform that securely manages users' confidential information in IBM's cloud environment and offers a high degree of usability even in the absence of specialist personnel with advanced knowledge and techniques. Users can access a leading-edge MI service without initial investment, simply by paying running costs.



TABRASA



Tabula rasa is Latin for "a blank slate."

Like with the blank slate, we will engrave letters in the form of structuring, accumulating, and leveraging an abundance of knowledge to help generate new value for our customers. Thusly, we have named our product TABRASA.



Please click the link below to access our promotional video (only in Japanese)

https://www.youtube.com/watch?v=i_jlfMO_ipw

Nagase & Co., Ltd. strives to always be listening for the voices of the future, using TABRASA as a conduit to contribute to its customers' business success and innovation.

Customer Success !!

Powered by



TABRASA

Please access the following website for any inquiries about TABRASA (Japanese only).

<https://tabrasa.jp/>



(Reference) Information by Segment

<Net Sales/Operating Income by Location>

(100 millions of yen)

	FYE 03/20		FYE 03/21				
	Interim	Full-Year	Interim	Vs. PY	Year Forecast	Vs. PY	
Net sales	Domestic	807	1,577	655	81%	1,379	87%
	Overseas	288	558	238	83%	473	85%
	Eliminations	(223)	(442)	(191)	-	(427)	-
	Total	872	1,693	702	80%	1,425	84%
Operating income	Domestic	20	40	16	80%	33	83%
	Overseas	8	14	5	59%	10	73%
	Eliminations	(0)	(1)	(1)	-	(1)	-
	Total	28	53	20	72%	42	78%

*Figures above are a combination of consolidated entities by location.
Inter-region eliminates are not reflected; adjusted provided in the eliminations column.
(Includes amortization of goodwill and technology-based assets)

FYE March 2021 Second Quarter Results

Net sales

¥70.2 billion (80%)

- ◆ The Performance Chemicals Business recorded lower sales due to lower sales in coating raw materials and urethane materials as a result of lower automotive production
- ◆ The Specialty Chemicals Business recorded lower sales overall due to falling sales of processed industrial oil solutions and plastic materials resulting mainly from lower automotive production, despite strong performance of the filter business mainly due to growing demand for TVs/monitors

Operating income

¥2.0 billion (72%)

- ◆ Lower profits, mainly due to lower sales.

FYE March 2021 Outlook

- ◇ In the second half, sales are to increase for products like coating raw materials, urethane materials, and processed industrial oil solutions mainly due to recovery in automotive production, and we forecast an increase in sales versus the first half
- ◇ For the full year, impact is to grow from the COVID-19 pandemic, with forecasted decreases in both sales and profit

<Net Sales/Operating Income by Location>

(100 millions of yen)

	FYE 03/20		FYE 03/21				
	Interim	Full-Year	Interim	Vs. PY	Year Forecast	Vs. PY	
Net sales	Domestic	891	1,749	717	80%	1,485	85%
	Overseas	863	1,653	819	95%	1,571	95%
	Eliminations	(378)	(731)	(293)	-	(646)	-
	Total	1,377	2,670	1,243	90%	2,410	90%
Operating income	Domestic	28	54	17	63%	27	50%
	Overseas	17	30	18	105%	31	103%
	Eliminations	(1)	1	(1)	-	(4)	-
	Total	44	85	34	78%	54	63%

*Figures above are a combination of consolidated entities by location.
Inter-region eliminates are not reflected; adjusted provided in the eliminations column.
(Includes amortization of goodwill and technology-based assets)

FYE March 2021 Second Quarter Results

Net sales

¥124.3 billion (90%)

- ◆ The Colors & Advanced Processing Business recorded lower sales overall, mainly due to decreased sales of dyes and additives, digital print processing materials, and plastic resins for industrial and packaging applications and conductive materials in Japan
- ◆ The Polymer Global Account Business recorded lower sales overall due to decreasing sales in Japan and ASEAN, while sales were slightly down for plastics in Greater China

Operating income

¥3.4 billion (78%)

- ◆ Lower profits due to declining sales and degraded market conditions in the digital print processing materials business

FYE March 2021 Outlook

- ◇ In the second half, although sales of dyes and plastics are expected to gradually recover, sales of digital print processing materials are expected to decrease due to COVID-19, with this impact forecasted to lead to falling sales and lower sales versus the first half
- ◇ We project lower sales and profits for the full year

<Net Sales/Operating Income by Location>

(100 millions of yen)

	FYE 03/20		FYE 03/21				
	Interim	Full-Year	Interim	Vs. PY	Year Forecast	Vs. PY	
Net sales	Domestic	583	1,174	557	96%	1,126	96%
	Overseas	325	661	338	104%	615	93%
	Eliminations	(336)	(684)	(351)	-	(716)	-
	Total	573	1,151	544	95%	1,025	89%
Operating income	Domestic	20	39	22	110%	42	107%
	Overseas	9	17	14	147%	23	133%
	Eliminations	+0	(3)	(1)	-	(3)	-
	Total	31	53	35	113%	62	115%

*Figures above are a combination of consolidated entities by location.
Inter-region eliminates are not reflected; adjusted provided in the eliminations column.
(Includes amortization of goodwill and technology-based assets)

FYE March 2021 Second Quarter Results

Net sales

¥54.4 billion (95%)

- ◆ Although sales of abrasive-related products for intermediate semiconductor processes and materials for notebook PCs were strong, sales of photolithography materials, formulated epoxy resins, and equipment-related products decreased, resulting in a decrease in sales as a whole

Operating income

¥3.5 billion (113%)

- ◆ Despite reduced sales, increased profitability in certain manufacturing subsidiaries led to higher profit

FYE March 2021 Outlook

- ◇ In the second half, formulated epoxy resins are to recover in on-board applications and remain strong in electronic components used for mobile devices, leading to increased sales versus the first half. However, in our business for notebook PCs and other products, given the uncertainty in the display-related market ahead we forecast lower sales versus the first half, and lower sales in the segment overall versus the first half
- ◇ For the full year, despite reduced sales, impact from improved profit and loss in certain manufacturing subsidiaries and other factors are expected to lead to higher profit

<Net Sales/Operating Income by Location>

(100 millions of yen)

	FYE 03/20		FYE 03/21				
	Interim	Full-Year	Interim	Vs. PY	Year Forecast	Vs. PY	
Net sales	Domestic	387	764	251	65%	611	80%
	Overseas	384	723	291	76%	627	87%
	Eliminations	(116)	(227)	(82)	-	(218)	-
	Total	656	1,260	460	70%	1,020	81%
Operating income	Domestic	5	10	(1)	-	3	37%
	Overseas	5	8	2	46%	8	102%
	Eliminations	+0	+0	+0	-	+0	-
	Total	11	18	1	10%	11	58%

*Figures above are a combination of consolidated entities by location.
Inter-region eliminates are not reflected; adjusted provided in the eliminations column.
(Includes amortization of goodwill and technology-based assets)

FYE March 2021 Second Quarter Results

Net sales

¥46.0 billion (70%)

- ◆ In the Mobility Solutions Business, sales declined due to reduction in the resins business in all regions other than Greater China, mainly caused by lower automotive production in the aforementioned regions

Operating income

¥0.1 billion (10%)

- ◆ Lower profits, mainly due to lower sales.

FYE March 2021 Outlook

- ◇ In the second half, automobile production is to recover, resin sales in Japan and overseas are to increase compared to the first half, and sales of materials and parts related to car electronics are to remain strong mainly due to the launch of new businesses, leading to a forecast of increased sales versus the first half
- ◇ For the full year, impact is to grow from the COVID-19 pandemic, with forecasted decreases in both sales and profit

<Net Sales/Operating Income by Location>

(100 millions of yen)

	FYE 03/20		FYE 03/21				
	Interim	Full-Year	Interim	Vs. PY	Year Forecast	Vs. PY	
Net sales	Domestic	508	1,044	495	97%	1,002	96%
	Overseas	73	468	512	695%	986	210%
	Eliminations	(145)	(298)	(148)	-	(333)	-
	Total	437	1,215	859	196%	1,655	136%
Operating income	Domestic	32	67	30	95%	58	86%
	Overseas	3	19	28	721%	53	271%
	Eliminations	(16)	(47)	(29)	-	(55)	-
	Total	19	39	30	152%	56	141%

*Figures above are a combination of consolidated entities by location.
Inter-region eliminates are not reflected; adjusted provided in the eliminations column.
(Includes amortization of goodwill and technology-based assets)

FYE March 2021 Second Quarter Results

Net sales

¥85.9 billion (196%)

- ◆ Sales increased mainly due to increased sales of pharmaceutical raw materials/intermediates and medical materials and of hygiene products-related materials, and due to the addition of sales from the Prinova Group, factors that compensated for the decline in the sales of TREHA™ and other food materials (other than Prinova Group) and AA2G™ and other cosmetics-related materials

Operating income

¥3.0 billion (152%)

- ◆ Higher profits, mainly due to higher sales.

FYE March 2021 Outlook

- ◇ In the second half, sales of Prinova will continue to be strong, with sales at similar levels to those in the first half, and sales of pharmaceutical raw materials and intermediates, as well as medical materials, are expected to remain strong. However, we presume that there will be continued impact from the COVID-19 pandemic and inbound demand will not recover, with sales of Hayashibara Co., Ltd. products like TREHA™ and AA2G™ to be lower versus the first half, leading to a forecasted decrease in sales overall for the segment versus the first half
- ◇ For the full year, impact is to grow from Prinova consolidation, with forecasted increases in both sales and profit

Please use the following contact information to reach us in the event of any inquiry regarding today's presentation or regarding these materials.

Contact:

Commercial Legal / IR Team, Planning Management Office, Corporate Planning Headquarters

Phone: +81-3-3665-3028

Inquiry Form: <https://www.nagase.co.jp/english/contact/>

* Please click the above URL, select the "For inquiries about our financial information and other IR related topics" button, and fill out the form on the following page to contact us.



Bringing it all together

<https://www.nagase.co.jp/english/>

These presentation materials contain forward-looking statements based on assumptions, forecasts, and plans as of November 26, 2020. Actual earnings may differ from projections due to risks and uncertainties in the future global economy, competitive landscape, currency exchange rates, etc.