AUTONOMOUS CONTROL SYSTEMS LABORATORY

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ACSL keeps growing with market demand

3.7 to 12.8 (MM JPY)

Sales growth in last 3 years[1]

Became Profitable

First operating profit since establishment

≈350 units

# of drones produced (FY17/03~19/03)

≈50 employees
12 nationalities

# of emoployees[2]
# of nationalities

1：FY18/03~FY20/03の売上推移
2：2020年3月末時点の社員数

FY20/03 Highlights

- Achieved over **50% year-on-year growth in sales** and realized **operating profit**
- While sales fell short of the forecast**,** **operating income overachieved the forecast** due to an improvement in the gross profit margin and a reduction in SG&A expenses. **Ordinary income and net income also far exceeded forecasts**
- Sales increased significantly due to increase in "Provide Solution" (STEP1, 2). Though Mass Production (STEP3, 4) and Others decreased. whole sales achieved higher sales than last year
  - ✓ **"Provide Solutions" continues to expand greatly**, with existing customers. As a result, the Mass Production did not grow as expected.
  - ✓ "Provide Solutions" (STEP1, 2) greatly expanded to JPY860 mn **due to acquisition of new customers and other applications from existing customers**
  - ✓ Mass Production (STEP3, 4) did not grow more than expected due to customer's budgetary allocations to STEP1 and 2
- Gross profit also increased significantly YoY(+100%). **Gross profit margin reached 60% of target**
- While increased personnel, through efficiency improvement, **R&D expenditure achieved the target ratio of to sales of 20-25%**
- Accelerated **deployment of actual operations** mainly among existing customers. Also steadily expanded new customer base
- Launched sales of **new platform drone** to meet domestic demand, such as PF2 and non-GPS-compatible drone, Mini
- Established partnerships with external Partners, Including **Investments in AutoModality**

Financial Highlights

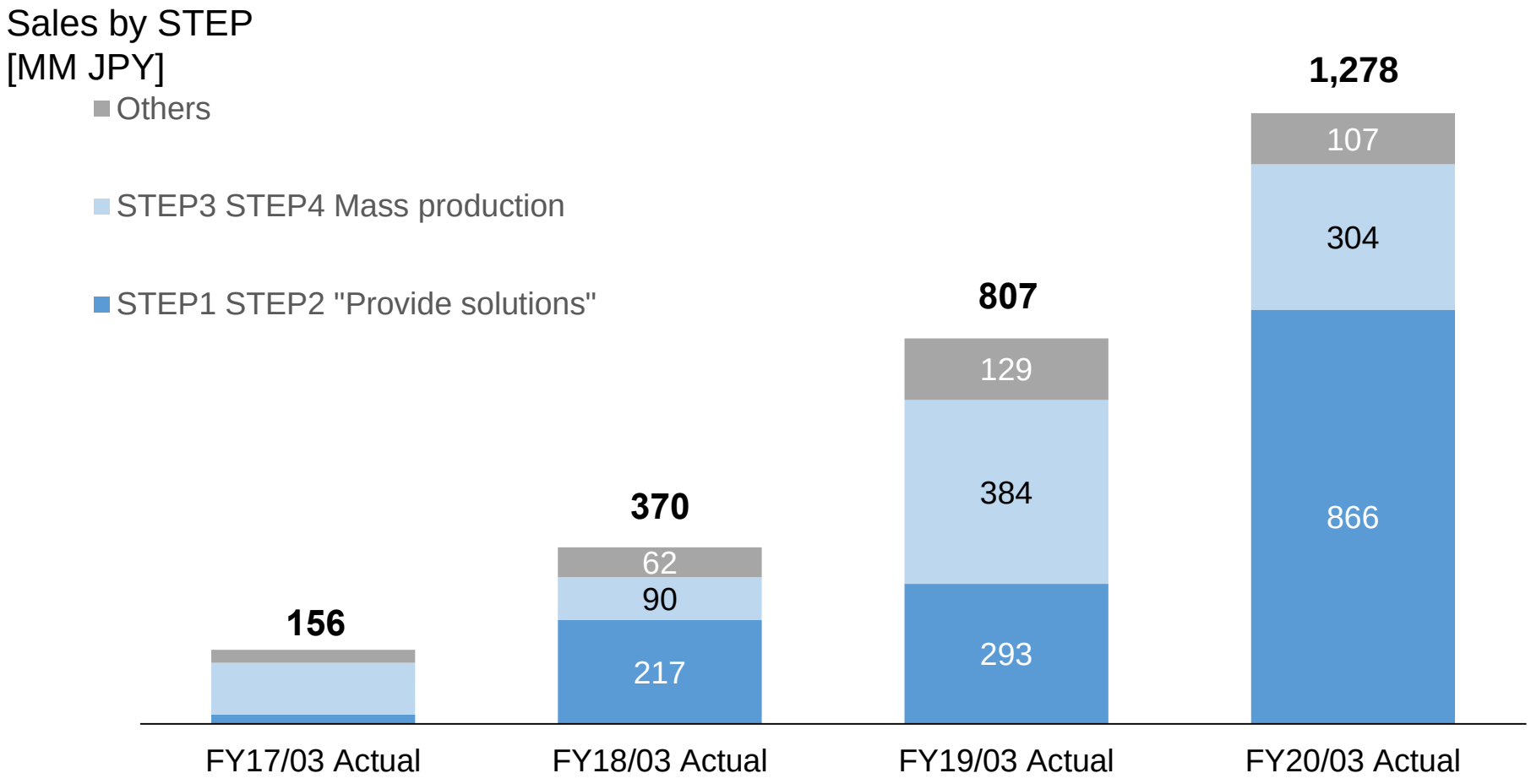
Achieved sales of JPY1,278 mn. Achieved over 50% growth in sales YoY. Significant increase in gross profit and achievement of single-year operating profit

[MM JPY]

	FY20/03		FY19/03	FY18/03
	Actual	YoY	Actual	Actual
Sales	1,278	+58.4%	807	370
Gross profit	808	+100.5%	403	177
Gross profit margin	63.2%	+13.2 ppt	50.0%	47.8%
Operating income	15	-	▲330	▲542
Ordinary income	231	-	▲176	▲454
Net income	241	-	▲183	▲460

Sales Transition

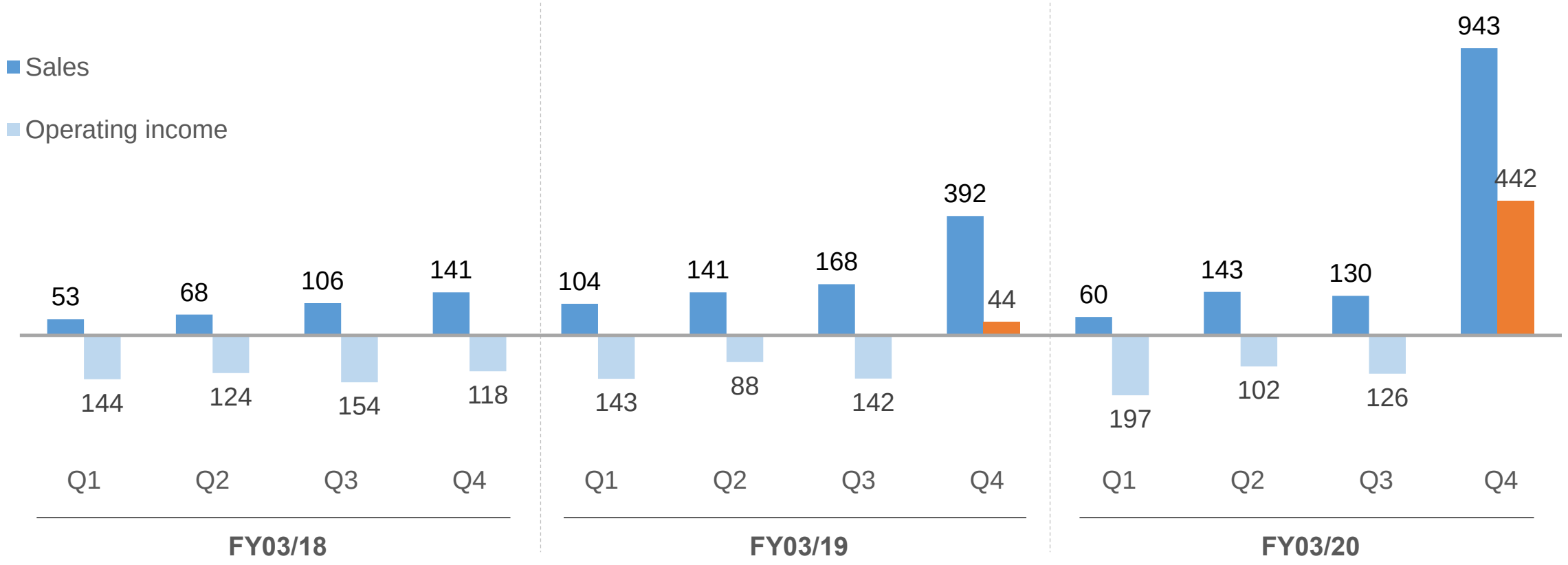
Provide Solutions (STEP1, 2) increased significantly. Mass Production (STEP3, 4) and Others decreased but whole sales achieved higher sales than last year



Sales and Operating profit by quarter

High seasonality on sales (Q4) due to booking sales from large-scale projects. Achieved operating profit in Q4and full-year profitability

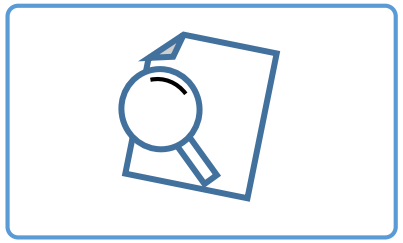
Sales and Operating profit by quarter
[MM JPY]



Provide Solutions Sales

"Provide Solutions" (STEP1, 2) conducted 112 projects according to new customers and other application from existing customers, and sales increased significantly to JPY860 mn

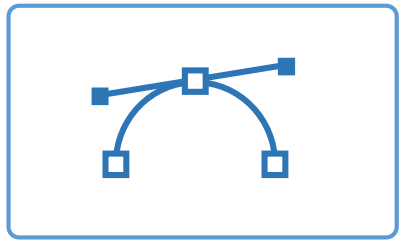
STEP 1
Proof of Concept



Proof of Concept
(Detail out drone usage)

- Verification of feasibility of drone usage concept
- Closed trials
- Use of ACSL platform drones

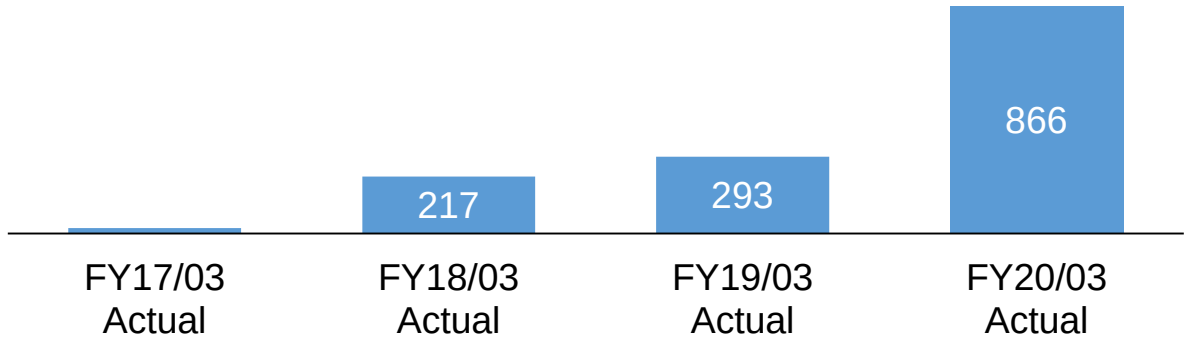
STEP 2
Custom Development



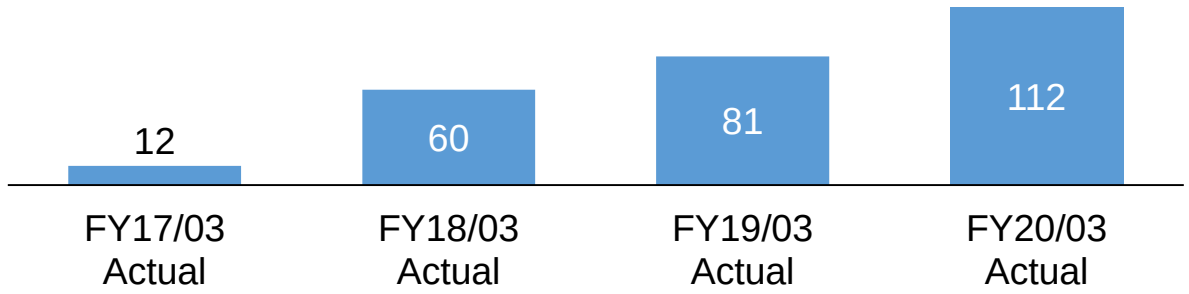
Custom Development
(Design and develop entire system)

- Detail test designs
- Development of customized drones and systems
- Testing at low risk environments

“Provide Solutions” (STEP1,2) Sales (MM JPY)



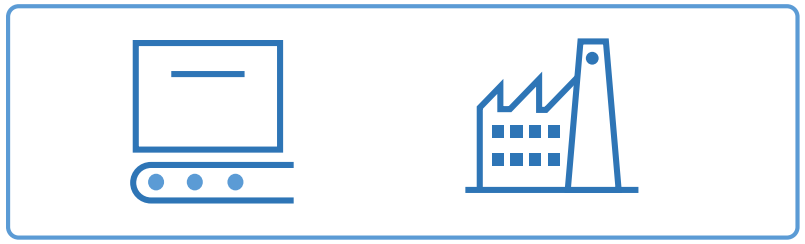
“Provide Solutions” (STEP1,2) Number of deals



Mass Production Sales

While number of units shipped remained flat YoY, sales decreased. Mass production didn’t grow as expected due to customers’ budgetary allocations to STEP1 and 2

STEP 3 / STEP 4
Mass Production

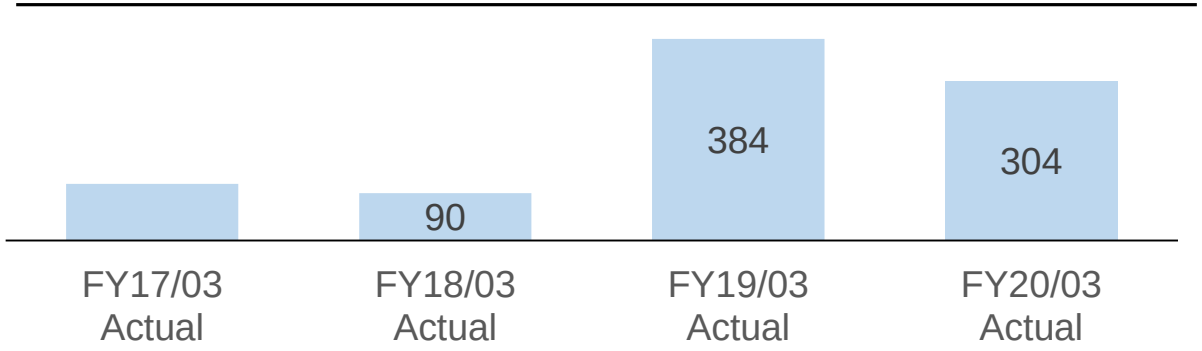


Deployment for commercial usage
(Sales of mass production model)

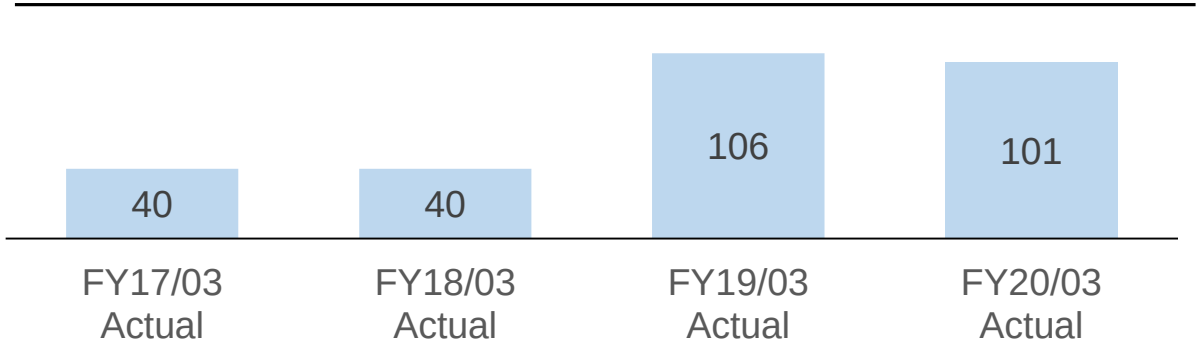
- Supply improved customized drones and systems
- Pilot or commercial use at actual sites by clients

*STEP 4 is more than 10 units sales per client in a year. Standard model sales is also included.

“Mass Production” (STEP 3,4) Sales (MM JPY)



“Mass Production” (STEP 3,4) Number of Units



Others

Although national project sales decreased from JPY65 mn to JPY18 mn from previous year, maintenance expanded steadily year over year

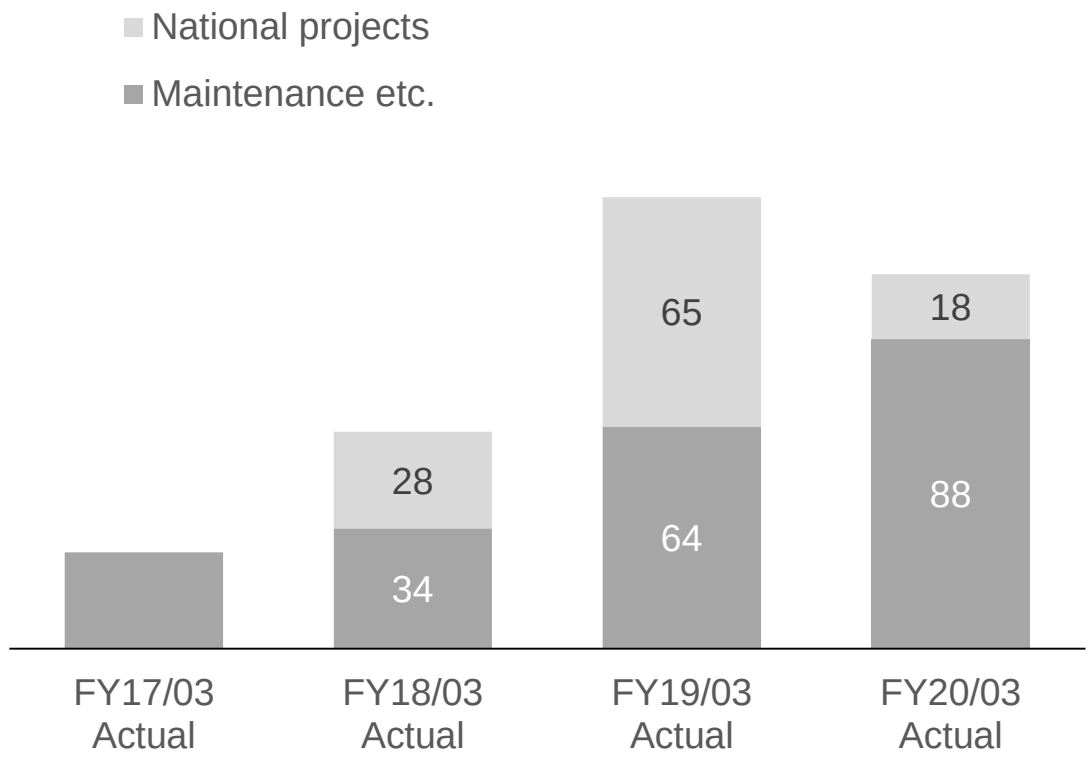
Others

Maintenance after drone installation
(Parts sales, Repair etc.)

- Sales of drone parts
- Repair service
- Some national projects

* While subsidies from national projects should in general count as a non operating income, some national projects count as a sales

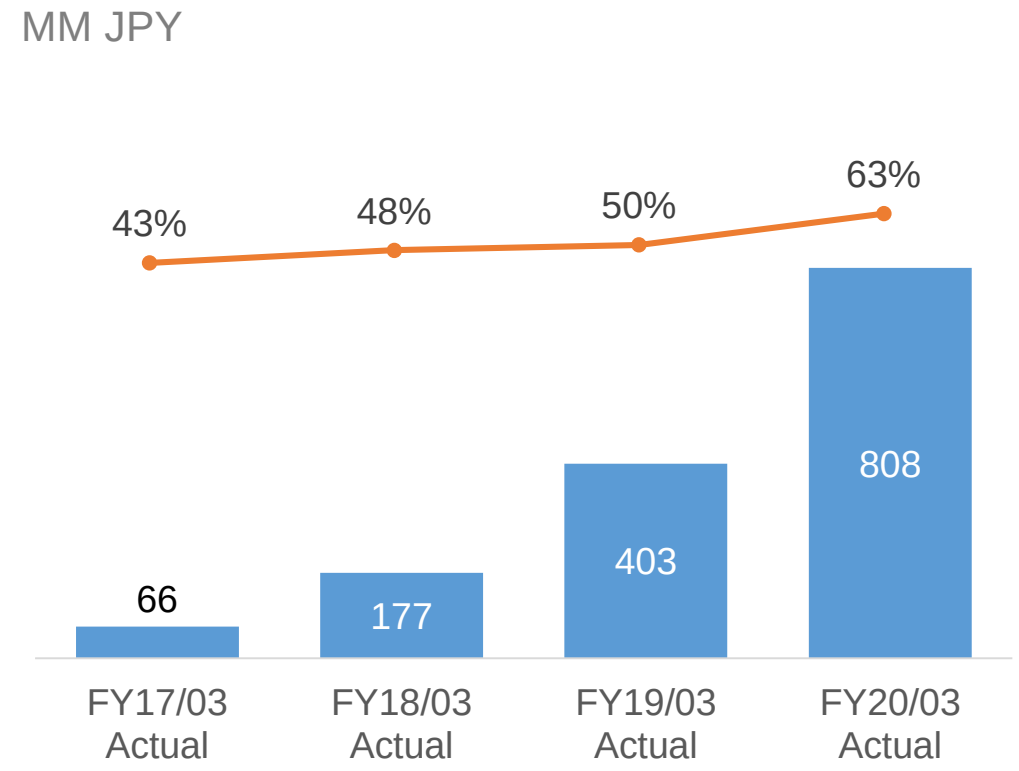
Other Sales (MM JPY)



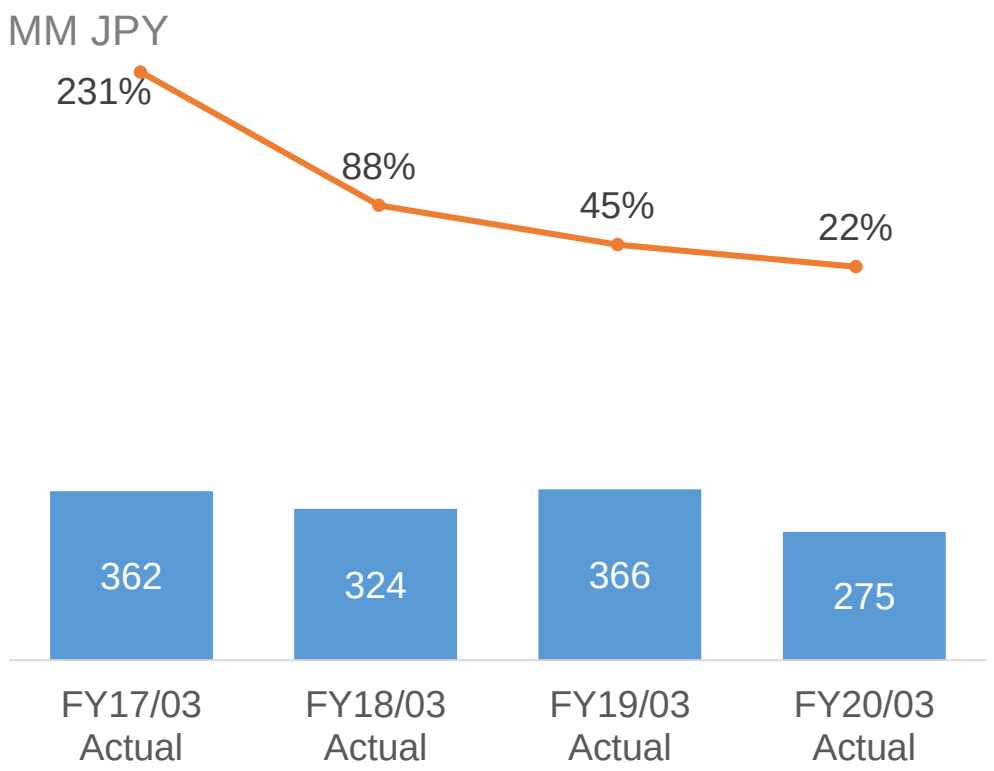
Gross Profit and R&D Expenditure

Gross profit increased YoY with sales increase, and the gross profit margin reached 60% of the target.
R&D expenditures achieved targeted ratio to sales of 20-25%

Gross Profit and Gross Profit Margin



R&D Expenditures and Ratio to Sales



Comparison with Forecasts

While sales fell short of the forecast, operating income exceeded the forecast due to an gross margin improvement and reduction in SG&A expenses. Ordinary/Net income also exceeded forecasts

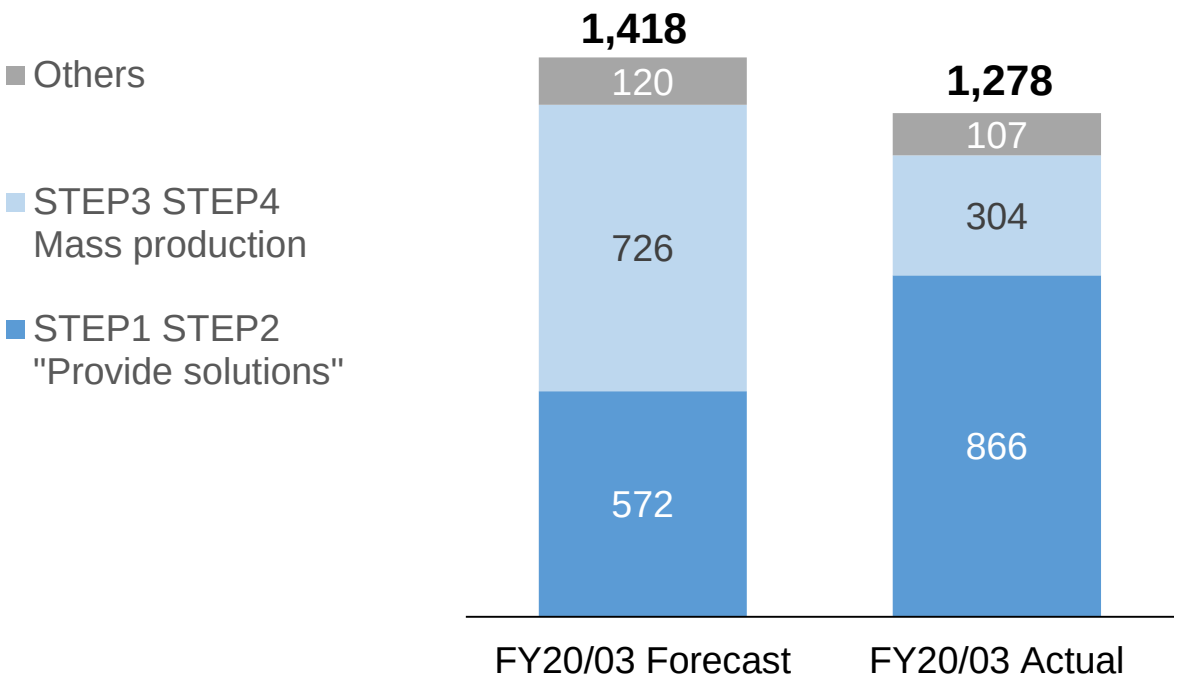
[MM JPY]

	FY20/03 Actual	FY20/03 Forecast	Achievement	Major Difference Factors
Sales	1,278	1,418	90.2%	Done Mass production unable to achieve target
Gross profit	808	850	95.1%	Decrease in sales
Gross profit margin	63.2%	60.0%	+3.2 ppt	Improvement in gross margin due to orders for large-scale projects
Operating income	15	9	175.8%	Cost control in SG&A expenses in line with sales scale
Ordinary income	231	187	123.2%	Control of non-operating expenses e.g., cost of business sites relocation
Net income	241	119	201.9%	Record of deferred tax assets

Comparison of Sales with Forecast

"Provide Solutions" continues to expand greatly, with existing customers. As a result, Mass production did not expanded as planned

Sales by STEP
[MM JPY]



- Further cultivation of new customers, focusing on provide solutions
- Additional demand for customized development to refine functions to deployment in on-site
- Demand for PoC for different applications is also increasing among existing customers.
- As a result, the shift to mass production sales in existing customers has not progressed as anticipated, and the "Provide Solutions" has greatly expanded.
- Solution development enables integration into customer systems and grasping customers' needs which will lead to future drone sales. More focus on solution development in FY20/03

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Main Business Highlights for FY 20/03

In addition to the progress in demonstration and practical application of ACSL drones in various fields, steady expansion of business, including release of new drones and investment in a U.S. company

1Q	**ANA Holding** conducted **BVLOS (beyond Visual Line of Sight) flight** at Fukuoka City with support of **NTT docomo and Fukuoka City**	ANA docomo
	NEDO introduced autonomous drone flight using high precision location information with the Quasi Zenith Satellite System (QZSS)	NEDO
	KEPCO, NJS、KANSO CO, announced business alliance to enter into inspection business with drone in hydroelectric power stations （drone developed by NJS and ACSL)	NJS
	The Ground Self-Defense Force Eastern Division conducted disaster information gathering training as part of field training exercise (FTX) (ACSL signed agreement with the GSDF Eastern Division)	
	Unisys supports Tohoku Electric Power to "automate equipment patrols at thermal power plants" with robot and AI technology (ACSL drone was used)	UNISYS
2Q	Expand business into Southeast Asia with **Leave a Nest and Leave a Nest Singapore**	Leave a Nest
	ACSL releases the new **ACSL-PF2**	
	Invested US $ 2.8 million in **AutoModality.** Aiming for autonomous flight in a more advanced and complex non-GPS environment by incorporating AutoModality's technology	AutoModality
	Collaborated with **JSR and Accenture** on the development of a system that automatically evaluates the corrosion level of plant equipment with drone aerial photography and AI image recognition technology	JSR accenture
3Q	**Transported daily necessities and health supplements with drones** to 70 people in 40 households in an isolated area after typhoon Hagibis	ANA
	ACSL initiatives towards disaster prevention were highlighted in **"Innovate Japan", a broadcast by CNN International**	CNN
	Supported flight demonstrations of tunnel inspections conducted by **Zenrin Datacom and JR Hokkaido**	ZENRIN DataCom JR
4Q	Released **Mini, a "Made in Japan" small industrial drone** that can be used both indoors and outdoors	
	Support **Japan Post** for implementation of distribution trial with small unmanned aircraft	日本郵便

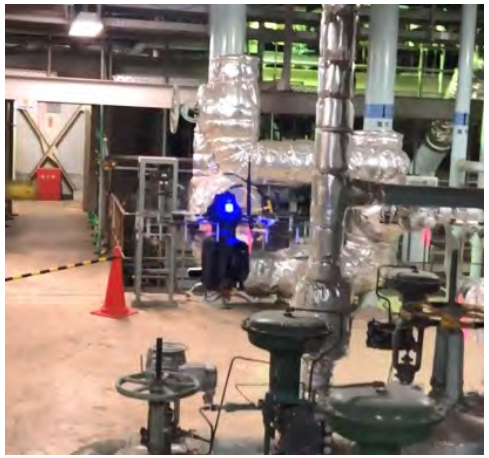
Successful Cases with Core Clients

JP
Inter-PO delivery

ANA
Inter-island delivery

Rakuten
Long distance delivery

UNISYS
Utility walkthroughs



JR Hokkaido
Tunnel inspection

JSR
Pipeline inspection

NJS
Hydro-tunnel inspection

Strong Customer Base in Key Applications

Steady expansion of customer base among major companies. About 80 core clients are looking to deploy customized drones for operation

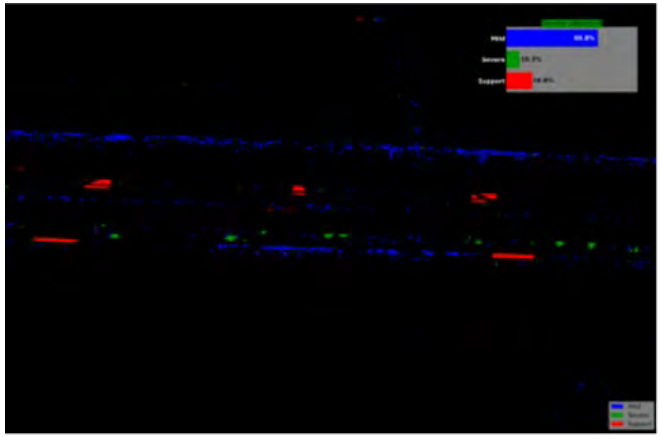
Application	Drone utilization	Examples of major customers (only disclosed base)
Inspection	▪ Substitution of existing visual inspection, reduction of high-risk site work ▪ Close inspection of a high/closed environments that have not been inspected	株式会社NJS, JSR, accenture, UNISYS, NTT docomo, 未来を創る現場力 西松建設, TODA, TAISEI, IDEMITSU, JR北海道
Delivery	▪ Substitution of existing distribution network, cost improvement, productivity improvement	日本郵便, ANA, Rakuten
Disaster reconnaissance	▪ Surveying locations that are inaccessible or at high-risk	総務省消防庁 Fire and Disaster Management Agency, 建設電気技術協会 AETELI, MORITA 株式会社モリタ

Inspection – Corrosion Evaluation System with JSR and Accenture

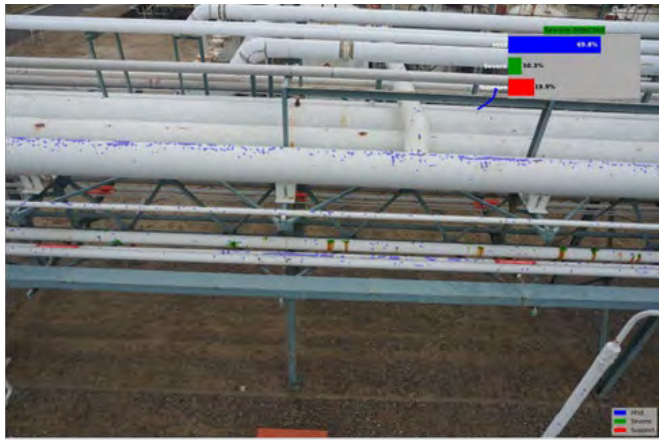
Developed a system that automatically evaluates severity of corrosion of plant equipment using drones and image recognition AI

Corrosion level determination system

- Collaboration with JSR: **“AI System Joint Development & Support Project”**
- Based on the results of demonstrations and experiments at the JSR Kashima Factory, ACSL developed an autonomous drone that can **fly even in non-GPS environments, and a mechanism that links aerial image data and the actual component**
- In addition, with Accenture, ACSL developed an **integrated AI application platform that enables analysis of images and data to determine the precise location of corrosion**



Corrosion evaluation image



Overlay of photographed image and corrosion evaluation image

Inspection –Alliance with Unisys for Automation of Equipment Patrol

Supported Unisys technology verification in Tohoku Electric Power’s “Automation system for equipment patrol at thermal power plants using robots and AI technology"

UNISYS

Foresight in sight

News Release

日本ユニシス株式会社　広報部

本社　〒135-8560 東京都江東区豊洲1-1-1
電話　03-5546-7404

日本ユニシス

**東北電力の「火力発電所における設備パトロール自動化」に向けた取り組みを
ロボット・AI 技術で支援
～パトロール業務の効率化と設備異常の早期発見に期待～**

日本ユニシスは、東北電力の「火力発電所における設備パトロール業務を、ロボットや AI 技術等により自動化させるシステム」の開発検討および実証に 2018 年度より参画しており、昨年度の実証において基礎技術の有効性を確認できたことから、2019 年度より本格的にシステム開発を支援します。

本システムは、2023 年 6 月に営業運転を開始する上越火力発電所第 1 号機および東北電力既設発電所での実用化を目標とし、更なる実証・開発を進め、将来的には他の設備産業への展開も見据えた汎用性の高いシステム構築を目指します。

【背景】

近年、設備点検におけるロボットや AI 技術の活用に大きな期待が寄せられています。
火力発電所では、設備の異常兆候を早期に発見しトラブルを未然に防止するため、発電所員が日々、設備および関連機器の状態を巡視により点検する設備パトロールを行っていますが、広い発電所内に設置された多数の設備一つ一つをきめ細やかにパトロールする必要があるために多くの時間と労力を要していることから、東北電力と日本ユニシスはロボットや AI 技術の活用による業務効率化について検討を重ねてきました。

【本システム開発について】

日本ユニシスは、2018 年度より東北電力の火力発電所の設備パトロールを自動化するシステムの開発検討および実証に参画し、基礎技術の検証を進めてきました。
2018 年 9 月に廃止した新潟火力発電所 4 号機の建屋内を試験環境とした実証では、非 GPS 環境下で操縦者を必要としない自律飛行可能なドローンを用いて飛行性能などの検証を重ね、パトロールの移動手段としての有効性を確認しました。

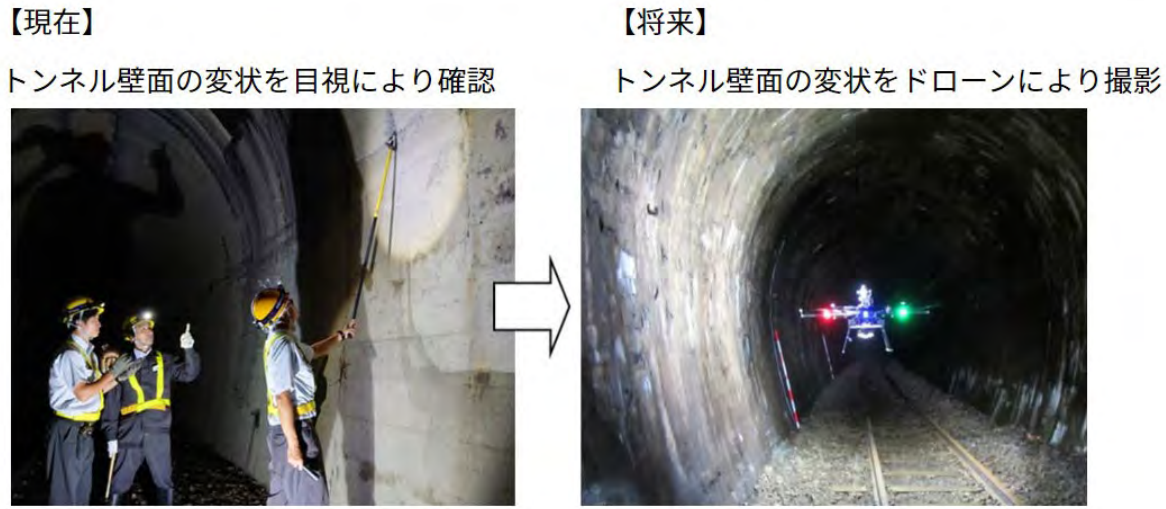
Source: Unisys

ACSL provides drones capable of autonomous flight in non-GPS environments
Source: Unisys

Inspection –Supported Zenrin Datacom and JR Hokkaido

ACSL provided drones for JR Hokkaido and Zenrin Datacom to conduct autonomous flight demonstration in tunnels, a non-GPS environment

- JR Hokkaido is considering **drones to supplement inspections conducted manually by eye**
- **Using photographs taken by drones**, they aim to improve maintenance efficiency and management of facilities in sight of future labor shortages, and to improve the safety of operations
- For stable flight in non-GPS environments, **laser sensors and computer vision technologies were used to recognize the cross-sectional shape of the tunnel in real-time and to calculate position of the drone relative to the tunnel**



Source: Zenrin Data Com Press Release

Logistics – Conducted delivery experiment over sea with ANA

Conducted BVLOS flight on two roots simultaneously with ANA and other 3 companies and succeeded in remote island delivery

ACSL cooperated remote island air delivery

- **ANA Holdings, LINE Fukuoka**, etc. conducted an experiment to fly by air in two locations in Fukuoka City in May 2007
- **ACSL offers a fully autonomous drone capable of "BVLOS and non-assisted flight"**
- **Japan's first experiment to fly multiple drones** at the same time with "BVLOS and non-assisted flight"
- This experiment is positioned as verification for realization of drone delivery service

SOURCE: ANAHD

SOURCE: ANAHD

Logistics – Support Japan Post and its Drone Operating Procedure

Japan Post carried out trial drone mail delivery. Drones delivered actual mail and packages to destinations in mountainous areas

Japan Post Release (17 Mar., 20)

日本郵政グループ

PRESS RELEASE

2020年3月17日
日本郵便株式会社

小型無人航空機を用いた配送試行の実施

日本郵便株式会社（東京都千代田区、代表取締役社長　衣川 和秀／以下「日本郵便」）は、小型無人航空機（以下「ドローン」）を用いた郵便物などの配送の試行を実施します。(注)
本試行では新たな取り組みとして、中山間地における配達先に、ドローンが実際の郵便物や荷物をお届けします。
日本郵便株式会社では、今後も新しい技術と物流の融合を図る取り組みを進めてまいります。

■概要
・運航期間：2020年3月17日（火）～同年3月19日（木）
・飛行区間：奥多摩郵便局（東京都西多摩郡奥多摩町氷川1379-6）配達区内
・飛行の詳細：別紙のとおり
・主　　催：日本郵便
・実施協力：下表のとおり

協力団体名	概　　要
株式会社自律制御システム研究所（ACSL）	ドローン「ACSL-PF2」の提供および運航の支援
東京都 奥多摩町	地域、関係団体などとの調整の支援

以　上

（注）日本郵便は、このたびの運航に当たり、国土交通省「無人航空機の飛行に関する許可・承認の審査要領」に基づき、補助者を配置せずにドローンを目視外飛行させる承認を得ております。
東空運第15961号、東空検第8518号（2019年12月25日付承認）
東空運第19557号（2020年3月3日付承認）

Shipping to mountainous areas

- **Japan Post** flies round-trip from Okutama Post Office to delivery destinations using drones during the trial period
- Obtained approval to do **BVLOS flight without a pilot,** based on the Ministry of Land, Infrastructure, Transport and Tourism's guidelines for Approval of Flights for Unmanned Aircraft.
- As a new initiative, **drones deliver actual mail and packages** to destinations in mountainous areas.
- **ACSL provides ACSL-PF2 platform** and supports flight operations
- **Japan Post and ACSL** continued the drone delivery initiative, which was conducted in Fukushima Prefecture, on Nov. 18.

Disaster reconnaissance – Transportation of Goods to Isolated Area

Used drones to transport daily necessities and medical supplies to an area that was isolated by typhoon damage to surrounding infrastructure

Governor Koike receiving explanation in front of drone

Emergency supplies transport

- Used drones to **transport daily necessities and medical supplies** to 70 people in 40 isolated households
- ACSL provided drone aircraft, and **ANA Holdings and NTT DoCoMo** assisted flight operations flight
- The drone flew **beyond visual line-of-sight (Level 3)** for 2.5 km and 5 minutes using LTE communication.
- While a normal flight requires prior application to the government, this flight was **performed under special permission, as granted under Japanese regulations for disaster response**

Disaster Reconnaissance – Covered on CNN Innovate

ACSL's initiatives towards disaster prevention were covered by CNN Innovate Japan.

CNN Innovate Japan

- **A special feature program offered by CNN International** that broadcasts with a central theme for each program
- ACSL drones for disasters prevention were covered as a Japanese initiative of **"cutting-edge disaster prevention technologies"**
- **Chris Raabe, ACSL CTO,** commented on human detection technology using cutting-edge AI and the possibility of using drones at time of disaster.

Source: CNN International Innovate Japan

History of Product Development

MS-06

Air Slider™

Mini

PF-1

PF-2

Developed ACSL-PF2 and Mini

Released ACSL-PF2 as a next-generation industrial platform, and Mini for non-GPS-compliant drones for operations in narrow spaces

ACSL-PF2 (medium size)

Key features of ACSL-PF2

- Responding to a **wide range of applications**, including inspections, delivery, and wide-ranging aerial photography
- **High customizability** due to the ability to mount various sensors
- Medium size with **top-of-the-class performance** with maximum flight time
- **Proprietary control technologies** and quality control that meets **ISO9001**

Mini (compact)

Key features of Mini

- Designed to mount camera on top of the body for applications such as **bridge inspections**
- 6-direction sensor, and additional stereo camera in the front for **collision avoidance**
- **Top-of-the-class flight time with 48 minutes**
- **Proprietary control technologies** and quality control that meets **ISO9001**

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Impact of the Novel Coronavirus (COVID-19)

No significant impact from the COVID-19 in FY03/20. Demands among customers and supply chains contains potential risks going forward. ACSL is addressing these risks respectively

	Potential risks	Recent Situation
Customer	• Reduction of customers' investment budget for new technologies such as drones due to economic and business downturn	• Visited each customer, assessed each customer's situation, and discussed how to proceed • Confirmed continued development of drone business in most existing customers
Supply chain	• Delays in production due to the inability to procure major parts caused by delays in suppliers' parts supply and the suspension of production	• Consider alternative candidates for major components • Despite a certain amount of delays in procurement in 1H of the fiscal year, it is expected to be resolved in 2H of the fiscal year
Operation	• Decrease in sales and business development activities • Suspension or slowdown of business activities due to spread of infections	• Since end of March, all employees have been asked to work remotely. • Resuming in-office development and production activities with skeleton crew from May
Finance	• Decrease in cash due to lower sales • Impairment risk caused by sluggish business activities of portfolio companies	• ACSL has sufficient cash reserves (JPY3.8 bn) • Prioritize cash flow by controlling costs at portfolio companies

Direction of FY21/03

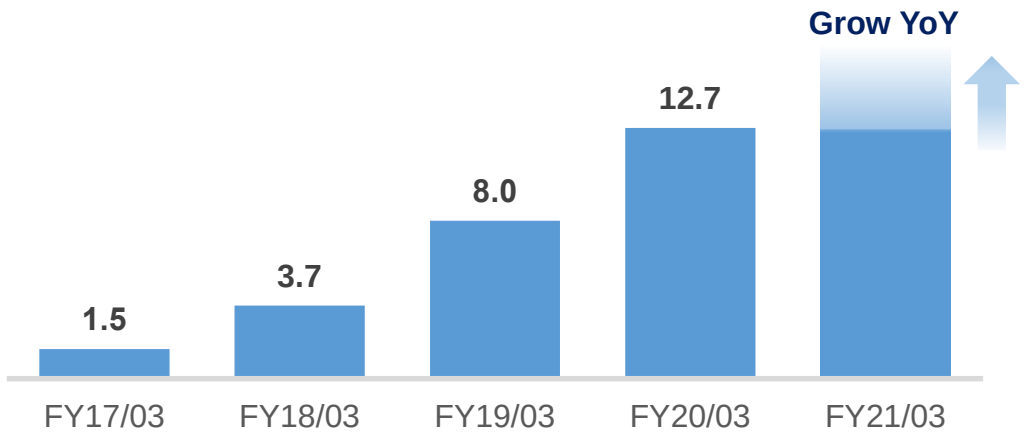
- Keep sales growth and maintain profitability
- Invest in core R&D such as Autonomous and SLAM
- Develop security technologies through national project
- Transition from prototype factory to drone manufacturer
- Continue to enhance R&D team and establish to address “COVID-19” structure e.g., remote work

Forecast FY21/03

While it is difficult to make reasonable forecasts due to the effect from COVID-19, ACSL aims to maintain sales and profits higher than in the previous fiscal year

Sales

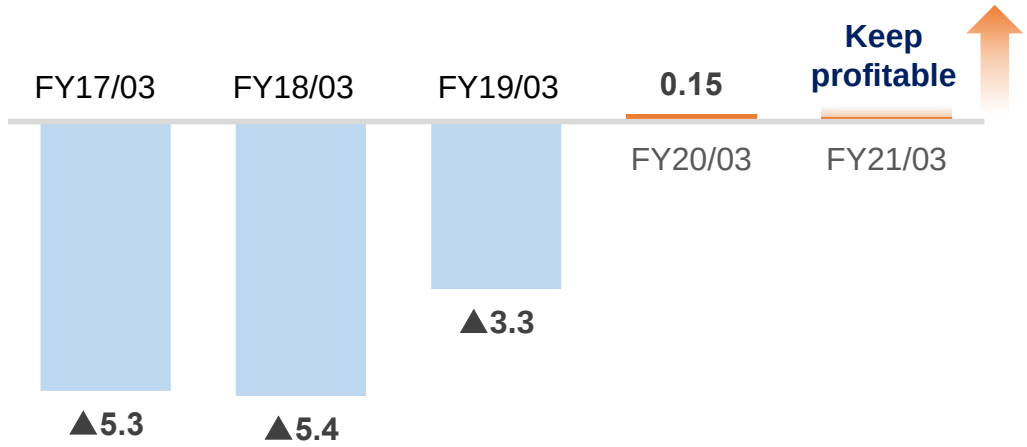
(100MM JPY)



- Despite the difficulty of forecasting demand due to the impact of the COVID-19, in addition to being a novel business, ACSL is aiming for sales growth YoY
- “Develop Solution” (STEP1, 2) keep the same number of projects from previous year. ASP is expected to decline due to the impact of the elimination of large-scale projects in FY20/03
- Mass production (STEP3, 4) is expected to increase more than previous fiscal year due to expansion driven by the new Mini. Unit price is expected to decline due changes in the product BOM

Operating profit

(100MM JPY)



- Gross profit target of 60% or more
- R&D expenditures, one of the main SG&A expenses, is targeted at 20% to 25% vs sales
- Aiming to achieve profitability in operating income by controlling costs

Business Plan

Accelerate mass-produced models by specific application to deploy actual operation and strengthen collaboration with partners and focus on core technology

1. **Develop, produce, and market mass production models by each application to deploy in actual operation**
   - Together with our core clients, identify the requirements for actual implementation and gather feedback to the development of mass production models.
   - Develop, produce and market mass production models that have evolved from prototypes and have been purified by application based on the knowledge obtained from PoCs
   - In addition to promoting the mass production of affordable small drones, such as the Mini, to respond emerging demand for security, ACSL will invest in development of secure technologies to realize the most secure products in Japan through national projects
2. **Through strong cooperation with external partners, expand sales network and focus on core technology development**
   - Reinforce solution partners and collaborate aggressively with industry groups to increase customer channels and increase market presence
   - Accelerate development of proprietary autonomous controls technology including SLAM through partnership with external partners
   - Improve production system through collaboration with external partners with high capability in development and mass production
3. **Strengthen internal systems to strengthen development capabilities and improve management and governance systems**
   - Continue to build a high-level development team with diversified members
   - Strengthen internal controls, such as improving governance through the establishment of the Compensation Committee

Our Mid-Term Corporate Strategy

From

"Prototype Factory"

To

"Drone Manufacturer"

Mass Production Model - Core Client Initiatives

NJS, one of ACSL's core clients, is developing custom drones to inspect closed spaces.

Expand application from inspection fo sewage systems to hydroelectric power plants and other uses.

Actual inspection scenario

2016~2017 Prototyping

- Examined feasibility of using drones to inspect sewage pipes
- Started prototyping
- Develop prototypes for Air Slider™

2018~ Customization

- Laucnch testing at real sites with a prototype
- Ongoing development of solutions to improve user-interface based on feedback from customers
- Development of cutomized software

2019~ Expansion to multiple applications

- Implementation of PoC at the Hydropower Station Inspection of Kansai Electric Power
- Improved model based on previous Air Slider

Drone for hydraulic iron pipe inspection

2020~ Deployment of mass production models

- Expected to develop a mass-production model for sewage pipe inspection
- Deploy system in actual operation in the field

Air Slider (4th generation)

NJS established a new company “Hokuo Infrastructure Science”

NJS established a new company “Hokuo Infrastructure Science” to promote adaptation to facility inspection and management in agricultural field

Drone co-developed with NJS

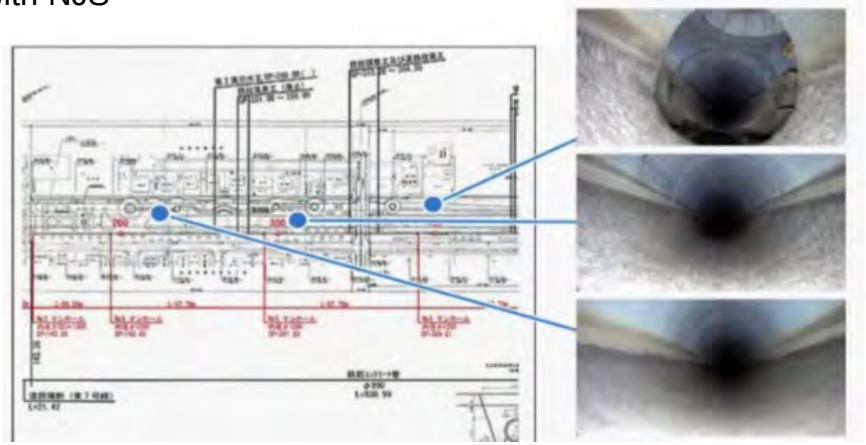


Image of swage pipe taken by Air Slider
(Source: NJS press release)

About New company

- To promote application to facility management in the agricultural field, **NJS established a new company** and launched business in cooperation with Hokkaido's comprehensive consulting company Hokuo Consultant Co
- Business started in April 6, 2020 with **NJS 90% ownership**
- Main business is to provide and sell survey and inspection services for agricultural drainage facilities, road crossing rainwater drainage pipes, sewer pipes, etc., mainly in the Hokkaido area, while **providing comprehensive services related to infrastructure management**

Mass Production Model - Demand for “Made in Japan” Drones

Increasing demand for “Made in Japan” drones in pursuit of data safety and reliability, a tailwind for ASCL

Support for “Made in Japan” drones

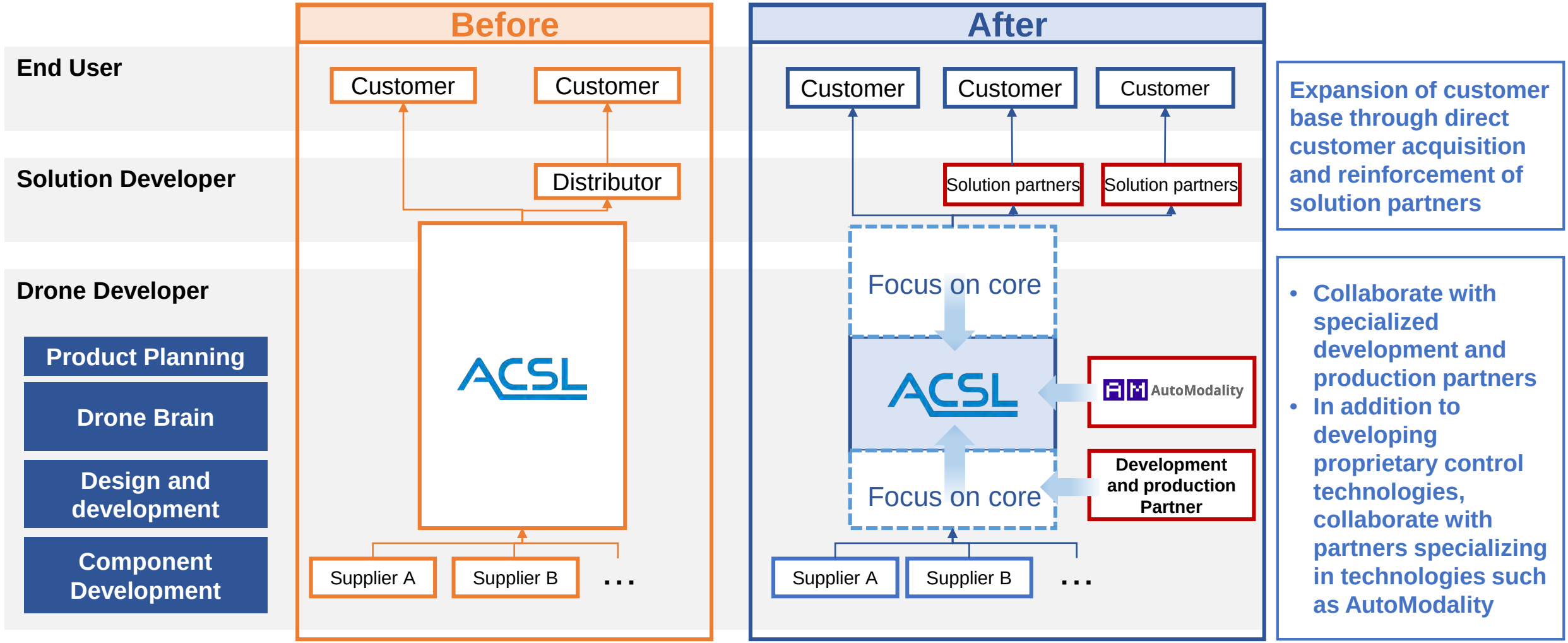
- In Dec. 19, METI allocated JPY1.61 bn as a supplementary budget for the development and production of government-procured drones as **“Safe and secure drone basic technology development"** project
- **Adoption of ACSL businesses** for the safe and secure drone basic technology development project by the New Energy and Industrial Technology Development Organization (NEDO)[1]
- Design and develop standard drones that ensure **safety and reliability in order to expand use of drones for government procurement** in fields such as disaster response, inspections,monitoring and surveying and others
- Consortium companies

Source: Outline of the draft amended budget for 19 by the Ministry of Economics and Industries.

1: The size of the project adopted is JPY1,568 mn, which is the scale of the business of the consortium as a whole, and it is not ACSL sole budget.

External Collaboration - Policies for External Partnerships

While ACSL had been in charge of various functions, through collaboration with partners specializing in other functions, ACSL will focus on the core, control technologies and product planning.



Expansion of customer base through direct customer acquisition and reinforcement of solution partners

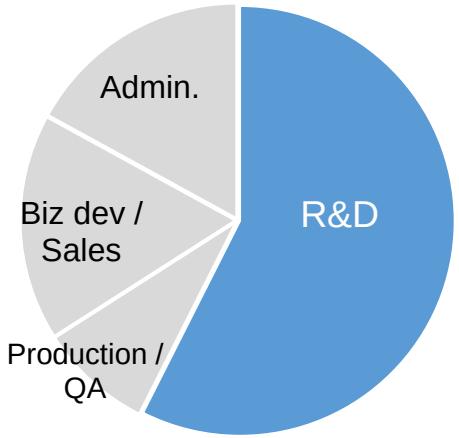
- **Collaborate with specialized development and production partners**
- **In addition to developing proprietary control technologies, collaborate with partners specializing in technologies such as AutoModality**

Strengthen development capabilities

Continue to increase personnel with highly-desired engineers in Japan and overseas with strong technical capabilities. R&D team realize large diversity, and secures top-level engineers.

Breakdown of employees and R&D team structure

Full-time employees at Mar.
(46 persons)



R&D team

Ph.D. about **20%**

Non-Japanese about **40%**

Nationality **12**

Table of Contents

Mission

技術を通じて、人々をもっと大切なことへ

Liberate Humanity through Technology

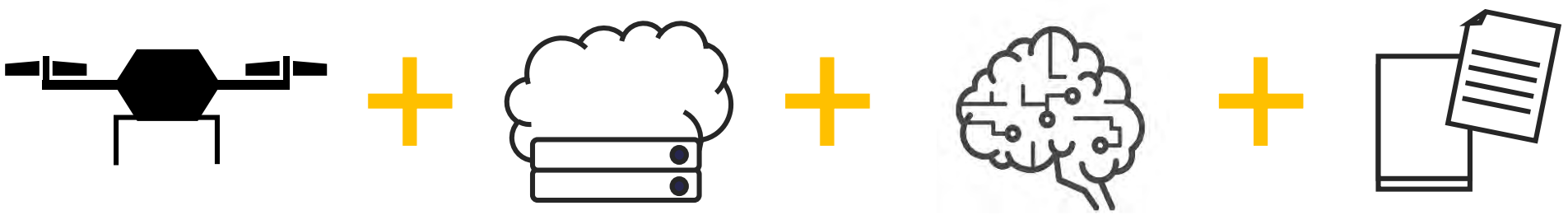
Vision

最先端のロボティクス技術を追求し、
社会インフラに革命を

Pursue cutting edge robotics technology to revolutionize social infrastructure

Business Overview

Unmanned IoT platform for industrial applications using drones



Drones + Cloud + AI + UI

ACSL Realizes Unmanned IoT Systems

ACSL provides integrated, autonomous, unmanned IoT drone systems to supplement human labor in inspection, delivery, disaster reconnaissance and survey

Today

Chemical plants

Inspection workflow

Taking photos → Filing → Analysis → Reporting

ACSL

ACSL

Industrial drone systems

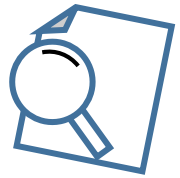
Provide an end-to-end integrated drone systems to fully automate current workflow

Drones + Cloud + AI + UI

Growth Model – Step-Wise Proof-of-Concept Approach

Lower entry barrier for clients and verify economic impact through PoCs and enhance relationship and continuity with clients supported by customized systems

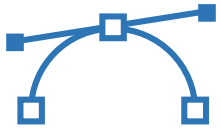
STEP 1
Proof of Concept



Proof of Concept
(Detail out drone usage)

- Verification of feasibility of drone usage concept
- Closed trials
- Use of ACSL platform drones

STEP 2
Custom development



Custom Development
(Design and develop entire system)

- Detail test designs
- Development of customized drones and systems
- Testing at low risk environments

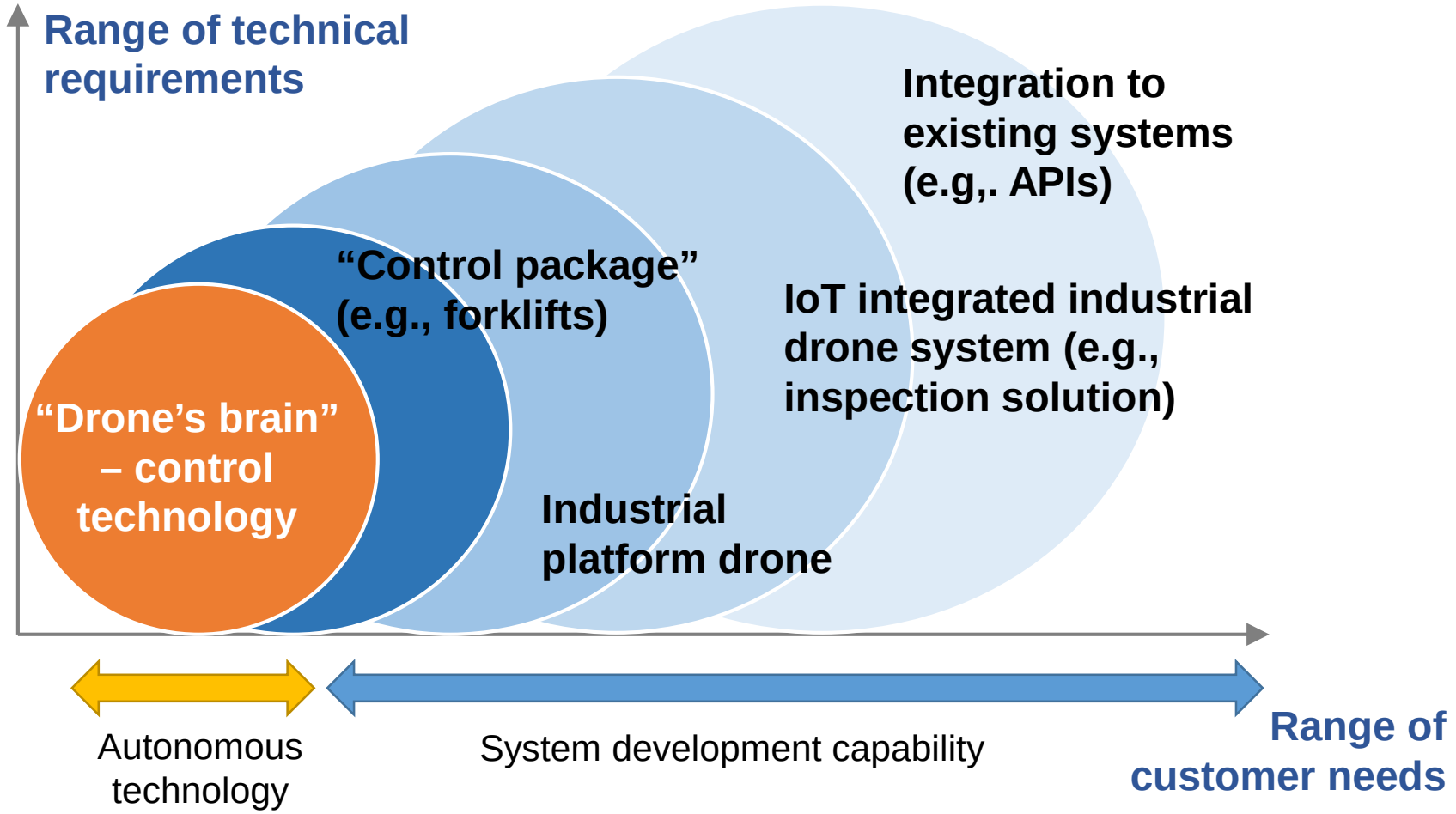
STEP 3 / STEP 4
Mass production

Deployment for Commercial Use
(Sales of mass production model)

- Supply improved customized drones and systems
- Pilot or commercial use at actual sites by clients

Core Technology – Drone's Brain and System Development

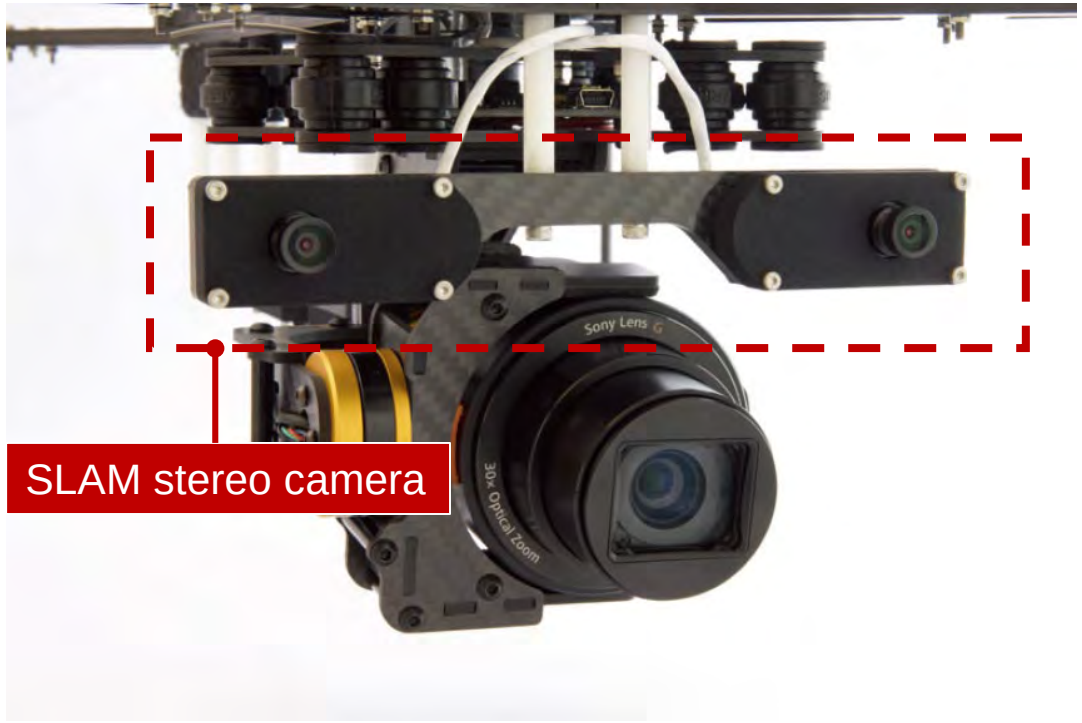
Propriety "drone's brain" – environmental recognition and controls –
enables ACSL to meet a wide range of customer demands



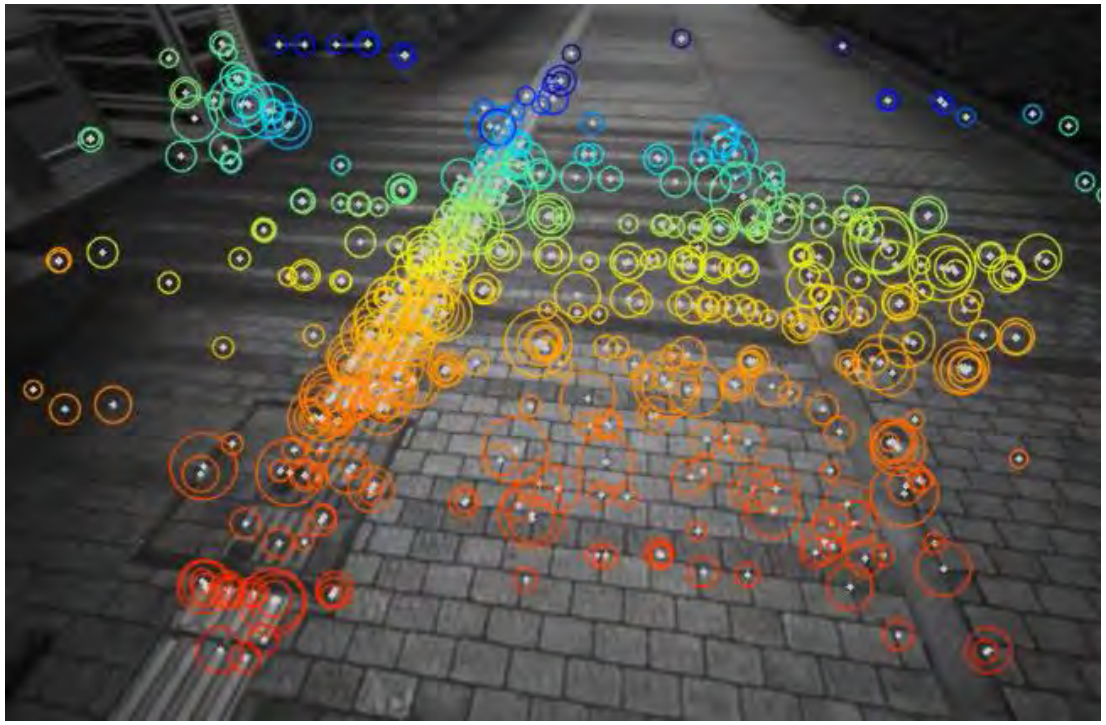
Core Technology – Cutting Edge Non-GPS Based Controls

Image processing based localization and mapping (i.e., Visual SLAM) enables drones to fly in GPS-denied environments

Visual SLAM Cameras

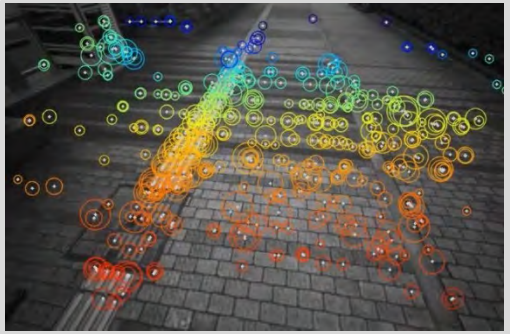


Extraction of Feature Points



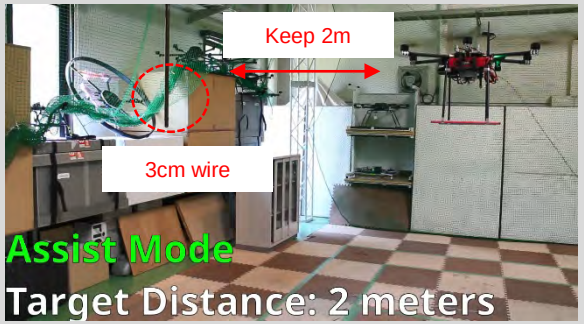
Core Technology – Edge Computing

NVIDIA’s embedded PC module Jetson TX2 is installed. Realizing highly reliable processing in real time with software that meets various needs



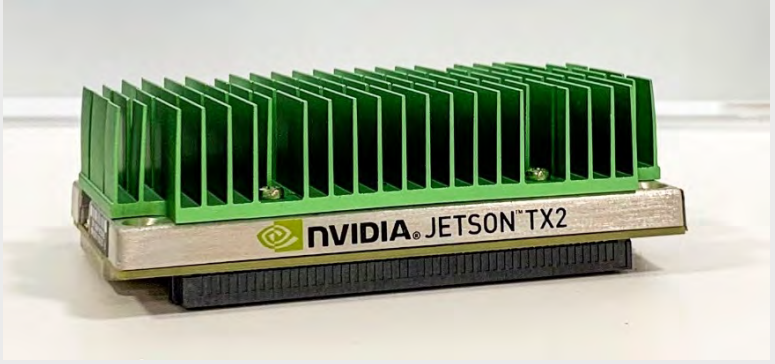
Visual SLAM

AI detecting safe landing spot



Distance control

Software is installed in embedded PC module mounted on drone

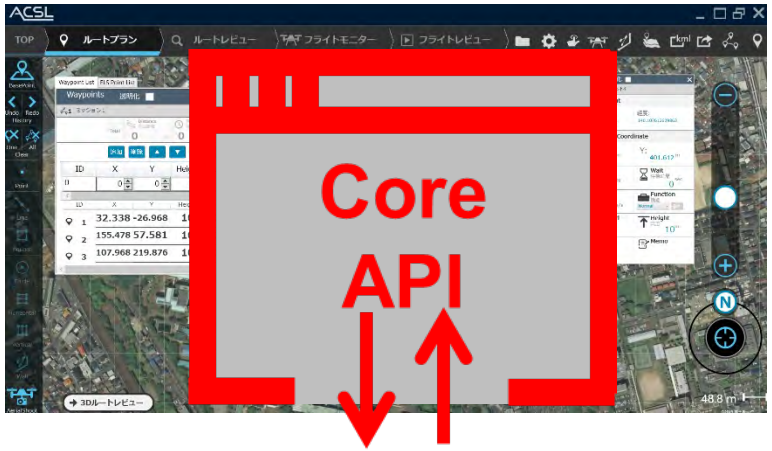


- ✓ Real-time and reliable data processing by edge computing
- ✓ Differentiate flight performance with image processing and AI
- ✓ Add safety features such as collision avoidance in combination with stereo cameras and LiDAR

Core Technology – Embedded System (Core API)

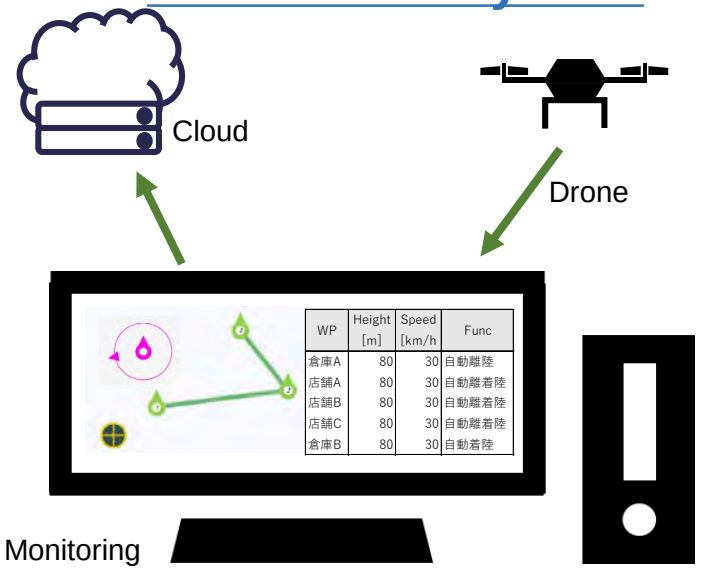
By opening APIs of in-house ground control stations, drone operation functions can be installed and extended to customer's systems

Core API



- ✓ API to communicate with ACSL drone
- ✓ Ground control station functions required for flight operations such as route plan creation and flight monitoring

Customer's System



- ✓ Optimize integration with customer's operations in system
- ✓ For example, integration into dedicated systems such as equipment inspection, logistics, and disasters

Potential Market - Potential Market for Drone Applications

Focus on the development of markets for inspections, delivery, and disaster reconnaissance, which require high-level autonomous flights with high frequency.

ACSL's main market

Source: Inspection (MLIT; "インフラメンテナンスを取り巻く状況") Delivery (MLIT; "平成28年度 宅配便等取扱個数の調査及び集計方法")
Disaster reconnaissance (Sankei News; 2017/12/22; "公共事業では防災・老朽化対応に重点") Aerial survey (MLIT; "建設関連業 登録業者数調査")
Aerial photography (MLIT; "改正航空法の運用状況") Agriculture (MAFF; "農業労働力に関する統計")

Potential Market - From “Testing" to “Social Implementation"

Illustrative examples

Inspection

Budget invested in infrastructure in FY18：2 trillion JPY

Evaluation of drones is in the “Inspection Support Technology Performance Catalog” compiled by the Ministry of Land, Infrastructure, Transport and Tourism

METI establishes Guidelines for Safe Operation of Drones in Plants

Delivery

Delivered package by Japan Post in FY 18：40 Billion

Japan Post carries out inter-post office transportation of for half a year

Rakuten conducts paid transportation service of food for one month

Disaster Reconnaissance

FY18 budget for disaster prevention by local governments ：1 trillion JPY

ANA and ACSL use special exceptions to transport goods to isolated villages after typhoon

A drone was used to investigate a distressed girl

Potential Market - Drones in the “Social Implementation” Phase

In the “social implementation” phase, industrial drones are required to have customized specifications adapted for each application

Illustrative examples

	Flare stack inspection	Tunnel / sewage pipe inspection	Logistics in remote islands
Application	Visual inspection of the top of the flare stack of an oil and chemical plant. Inspection only on sunny days. Obtain visible light images during the daytime in an environment with GPS.	Highway company road tunnels and power company drainage tunnels. Regular inspections, conducted in all weather. Visible light imaging in dark environment with non-GPS.	Drone transport as an alternative to boat transport between remote islands Conducted in all weather (excluding typhoons).
Required functions/ specifications	Outdoor wind resistance (resistance in all directions). Combination of camera and gimbal to acquire high-resolution images without approaching equipment. Minimize damage to petroleum and chemical plant equipment (explosion proof, absorption materials, etc.).	Autonomous flight technology under non-GPS environment (use of lidar sensor, etc.). Combination of flash, camera and gimbal for high-resolution shooting in dark environments. IP certification such as dust resistance and waterproofness. Flight stability against turbulence caused by a closed environment.	Due to the directivity of flight (the direction of travel is fixed), lift and wind resistance utilizing directivity Risk control for third parties Flight stability in response to weight changes of luggage.

Invested in AutoModality in US

Aiming for autonomous flight in a more advanced and complex non-GPS environments by incorporating AutoModality's technology

About Perceptive Navigation

- Self-localization technology focusing on object recognition using remote sensing technology (LiDAR)
- Able to operate in open spaces such as bridge inspections and increasing the accuracy of drone self-position estimation by recognizing the relative position to the object.

About AutoModality

- Conducts R&D and sales of flight software for drone with headquarters in New York and a development base in California
- In the past, won various awards in US and won business competitions

Carry out inspections of steel bridges
(Provided by AutoModality)

Accurate flight with Perceptive Navigation
(Provided by AutoModality)

Potential Synergies with AutoModality

Incorporating “Perceptive Navigation” into ACSL control technology to realize technology synergies and possible future entry into US market

	ACSL	AutoModality	Synergy
Technology	■ Self-localization technology for absolute coordinate system in the entire flight environment using image processing (Visual SLAM) ■ Autonomous flight technology (cerebellum) with proprietary control algorithms ■ Peripheral technologies such as inspection camera, cloud, analysis AI	■ Self-localization technology of relative coordinate system centering on the approaching object using LiDAR (Perceptive Navigation) ■ Off-the-shelf Chinese flight controller (cerebellum) ■ Off-the shelf Chinese products	
System	■ NVIDIA TX2 (cerebrum) ■ Proprietary flight controller (cerebellum) ■ Proprietary drone body	■ NVIDIA TX2 (cerebrum) ■ Off-the-shelf Chinese flight controller (cerebellum) ■ Off-the-shelf Chinese drone body	

Management Team

President **Dr. Hiroaki Ohta**

Ph.D. from Kyoto University. Assistant professor at Department of Aeronautics and Astronautics, Kyoto University, followed by research scientists at University of California, Santa Barbara. Also served as Technical Advisor for a start-up in Silicon Valley. McKinsey & Company from 2010. Joined ACSL as COO from July 2016 and became President from March 2018.

COO **Satoshi Washiya**

M.S. of Architecture from Waseda University. Served both domestic and multinational companies in corporate wide transformation projects at Tokyo and Stockholm office of McKinsey & Company. Joined ACSL in July 2016.

CFO/CAO **Kensuke Hayakawa**

M.S. of Management of Technology from Tokyo institute of technology. Implemented operational improvement/transformation of Portfolio companies at KKR Capstone. Joined ACSL as CFO in March 2017.

CTO **Dr. Chris Raabe**

Ph.D. from University of Tokyo. Embedded software engineer at Boeing from 2006. Assistant professor at Department of Aeronautics and Astronautics, University of Tokyo from 2014. Joined ACSL as CTO in April 2017.

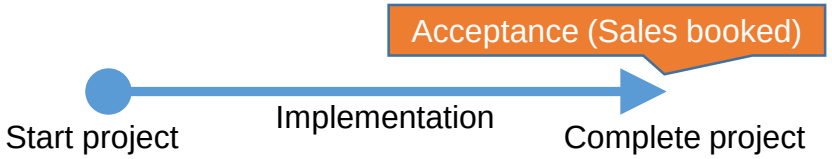
External Director	Masanori Sugiyama
External Director	Shinichi Suzukawa

Audit & Supervisory member	Akira Ninomiya
Audit & Supervisory member	Hideki Shimada
Audit & Supervisory member	Takeshi Ohnogi

(Reference) Sales Recognition and Seasonality

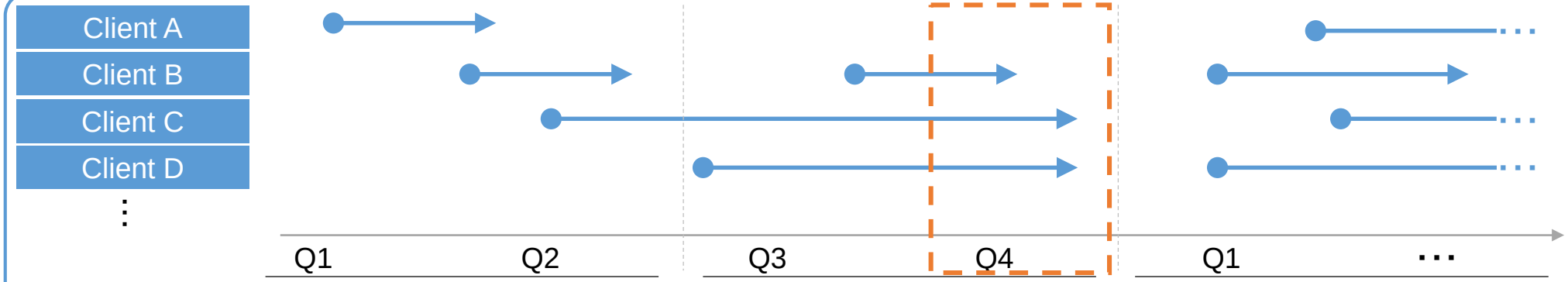
Sales are booked upon acceptance by client (at end of project). Seasonality increases towards 4Q driven by large-scale projects, mainly from existing customers

Sales Recognition



- Sales are booked at the time of acceptance by clients , at the end of each project
- Adopted for all projects regardless of duration or size

Large-scale projects and seasonality



	1H of fiscal year	2H of fiscal year	Next fiscal year
Features	• Mainly small projects • Mainly with new customers	• Mainly large projects • Many large projects are booked in March	• Projects become larger • No projects across year end due to budget cycle

Balance Sheet

[MM JPY]

	FY20/03 End of the fiscal year		FY19/03 End of the fiscal year	FY18/03 End of the fiscal year
	Actual	YoY	Actual	YoY
Current Assets	4,840	▲0%	4,858	2,290
Cash	3,775	▲15%	4,465	2,068
Fixed Assets	392	+469%	68	62
Total Assets	5,233	+6%	4,926	2,353
Current Liabilities	233	+4%	225	330
Long-term Liabilities	1	-	0	0
Total Liability	235	+5%	225	330
Net Asset	5,033	+7%	4,701	2,022
Total Asset	5,268	+7%	4,926	2,353

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