

Kudan Inc. (4425)



Corporate Information

Exchange	TSE Growth
Industry	Information and communications
Managing Director & CEO	Daiu Ko
Address	2-10-15 Shibuya, Shibuya-ku Tokyo
Year-end	End of March
URL	https://www.kudan.io/

Stock Information

Share Price	Shares Outstanding (end of term)	Total market cap	ROE Act.	Trading Unit
¥1,419	8,671,267 shares	¥12,304 million	-59.3%	100 shares
DPS Est.	Dividend yield Est.	EPS Est.	PER Est.	BPS Act.
0.00	-	¥63.47	-	¥88.84
				PBR Act.
				16.0 x

*The share price is the closing price on November 20. Number of shares outstanding, DPS, and EPS are taken from the financial results for the second quarter of the FY3/24. ROE and BPS are from the previous year.

Earnings Trend

Fiscal Year	Sales	Operating Income	Ordinary Income	Net Income	EPS	DPS
Mar. 2020 (Actual)	456	9	-12	-29	-4.17	0.00
Mar. 2021 (Actual)	127	-451	-1,575	-1,608	-214.97	0.00
Mar. 2022 (Actual)	271	-433	-681	-2,237	-283.74	0.00
Mar. 2023 (Actual)	332	-598	-394	-413	-49.30	0.00
Mar. 2024 (Estimate)	520	-560	-520	-550	-63.47	0.00

*Unit: yen, million yen. Net income is profit attributable to owners of the parent. Hereinafter the same shall apply. The earnings forecasts are that of the company.

This report briefly describes Kudan Inc., the financial results for the second quarter of the term ending March 2024, and growth strategies.

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Key Points

- **Kudan Inc. is a company that carries out research and development of deep technology specializing in the algorithms for artificial perception (AP), which corresponds to the “eyes” of machines (computers and robots). Its strengths and characteristics include the capability of flexibly responding to the growth of diverse demand, which is expected in the future, and a group of professionals in AP. The company has secured a firm position based on the alliance with Artisense Corporation, which is led by Professor Daniel Cremers, who has produced globally recognized research results as a pioneer in self-driving technologies.**
- **In the second quarter of the term ending March 2024, sales declined 52.6% year on year to 73 million yen, and operating loss was 395 million yen (a loss of 312 million yen in the same period of the previous year). Although the business, centered on product-related projects, is progressing smoothly, sales in the first half of the year decreased because the majority of sales from evaluation and development projects and product-related sales are expected to come in the second half. Operating loss augmented as SG&A expenses increased 13.1% year on year due to continued business expansions as well as system expansions.**
- **There is no change in the earnings forecast. It is expected that the sales for the term ending March 2024 will be 520 million yen, up 56.3% from the previous year, and operating loss will be 560 million yen, almost unchanged from the previous year. The company expects that the narrowing-down of focus areas will be effective and that product-related sales will drive growth. Thus, overall sales are projected to grow steadily. At present, confirmed sales are 410 million yen, including 70 million yen in the first half and 340 million yen in the second half. This is a 24% increase over the previous year and 79% of the full-year forecast. Therefore, the company's progress is on track. The company aims to achieve the budget by accumulating development and solution projects using the packages for mapping and robot products, which are scheduled for official release in the third quarter, as well as product license sales.**
- **On the other hand, expenses are projected to augment due to the projects which aim the development and sales of packages for products as well as the reinforcement of the system to expand product-related sales. Despite the ongoing appreciation of foreign currencies, progress is generally in line with the initial forecast.**
- **In September 2023, the company and Whale Dynamic Co., Ltd, a business partner and developer of autonomous driving solutions in China, signed a basic agreement for capital and business alliances. Since the launch of products incorporating Kudan’s technology in July 2022, demand for Whale Dynamic’s solutions in global regions such as Europe and the Middle East has grown along with the company’s growing track record in the Chinese market. Furthermore, the prospects for opportunities to offer Kudan’s technology in a broader range of Whale Dynamic products, such as autonomous driving for passenger cars, increased. Based on this business progress, the two companies will form capital and business alliances to strengthen their cooperative framework and jointly promote the sales of Whale Dynamic products and the spread of the company’s technology. Starting with this alliance, the company aims to expand product-related sales by promoting the transformation of business stages with partners in the same manner for the projects where the company’s technologies are commercialized by clients.**
- **The company is making steady progress in product commercialization by customers, with a total of four projects in the term ended March 2023, exceeding the three projects expected at the beginning of the term, mainly for robotics and mapping. The company believes that the capital and business alliances with Whale Dynamic will be a turning point that will accelerate the pace of product-related sales growth. Although the company will not disclose its forecast for the number of product commercialization projects from this fiscal year, we expect it to continue to publish releases on product commercialization projects and business progress on a quarterly basis.**

1. Company Overview

Kudan Inc. is a company that carries out R&D of deep technology (or deep tech), specializing in algorithms for artificial perception (AP) which acts as the eyes of machines, such as computers and robots.

Working in pairs with artificial intelligence (AI), which serves as the brain of machines, to complement each other as deep tech, AP helps machines evolve to function autonomously. The company operates business based on its unique milestone model focused on the deep tech that has an impact on a wide range of industries through highly sophisticated technological innovations.

【1-1 Corporate history】

Mr. Tomohiro Ohno, currently serving as a Managing Director, became convinced of the prospects and growth potential of the AP technology when working at Andersen Consulting (currently Accenture PLC) and set up Kudan Limited in the United Kingdom in January 2011, at which he pursued his own research and development on the Simultaneous Localization and Mapping (SLAM) technology that provides a basis for the AP technology.

In November 2014, he established Kudan Inc. intending to extend the administrative department through business expansion while moving further ahead with his research and development. The company started offering evaluation software for demonstration of the Kudan SLAM technology in December 2016 and officially began to provide Kudan SLAM in the term ended in March 2018.

It got listed on the Market of the High-Growth and Emerging Stocks (Mothers) of the Tokyo Stock Exchange (TSE) in December 2018.

In April 2022, the company got listed on the Growth Market of TSE, through market reclassification.

Consisting of four inside directors, Managing Director & CEO Daiu Ko, who joined the company after working for Toyota Motor Corporation and McKinsey & Company, Managing Director Tomohiro Ohno, Kohei Nakayama, a director and CFO, and Tian Hao, COO, Kudan's management team places a heavy emphasis on swiftness.

【1-2 Corporate philosophy】

Kudan's corporate philosophy is **“to stand alone, and dare to create what is new and different.”**

The philosophy guides the company into avoiding following suit and daring to challenge the generally accepted wisdom. Embracing the philosophy, the company aims to expand its business and research and development, raise shareholder interests, and become a one-of-a-kind company in the market by formulating policies that enable them to stand out from all other companies.

While adopting a corporate vision of “Eyes to the All Machines,” Kudan aims to become a player that offers technology essential for full autonomy and automation, goals that all kinds of machines and devices will strive to reach.

【1-3 Market environment】

In recent years, the increasing need for automation of operations in every industry and advancement of hardware technology, including sensors and semiconductors complementary to algorithms, have been rapidly spreading and practically utilizing the AP algorithms.

In addition, the impact of the spread of COVID-19 has resulted in soaring demand for saving labor and working remotely for operations that require neither human interaction nor group work in all industries. The growth of demand for automation technology, such as robotics, autonomous driving, and drones, is significant particularly in the fields of logistics, manufacturing, construction, retail, etc.

Target technology/device	Economic impact
IoT	<p>Real GDP boosted by the increase in the use of IoT and AI is estimated at 132 trillion yen in 2030.</p> <p>The number of people in employment in 2030 when the use of IoT and AI is promoted is facilitated further is estimated to be 63 million, up 7,390,000 compared to the number of people employed when the use of IoT and Ai is not promoted.</p>
AI	<p>GDP in 2030 is expected to be 9.8% (11.2 trillion dollars) to 14% (15.7 trillion dollars) higher with an impact of AI than without.</p>
Autonomous driving systems	<p>It is projected that the passenger economy (*) will stand at 800 billion dollars in 2035 and 7 trillion dollars in 2050 globally when autonomous cars are put into practice.</p> <p>The economic impact is broken down into Mobility as a Service (MaaS) for consumers (3.7 trillion dollars), MaaS for businesses (3.0 trillion dollars), and newly emerging driverless vehicle services (0.2 trillion dollars).</p> <p>*The passenger economy: economic and social value realized by level-5 fully autonomous cars</p>
Drones	<p>The market scale of the drone business in Japan is forecasted to be 193.2 billion yen in FY 2020, up 37% from the year before, and reach 642.7 billion yen in FY 2025 (about 3.3 times larger than that of FY 2020).</p> <p>Drone services were the strongest market in FY 2019 with a 68% year-on-year increase to 60.9 billion yen followed by the drone body market which grew 37% year on year to 47.5 billion yen and the drone peripheral services market which showed a 46% year-on-year rise to 32.6 billion yen.</p> <p>These three markets are expected to continue booming, with the market scales for FY 2025 are estimated at 442.6 billion yen (about 7.3 times greater than that of FY 2019) for the services market, 122.9 billion yen (about 2.6 times greater than that of FY 2019) for the body market, and 77.1 billion yen (about 2.4 times greater than that of FY 2019) for the peripheral services market, respectively, in descending order.</p>

*Created concerning "Reference material 2: Case studies for estimating the economic impact of advanced technology" used at the 10th meeting for discussing new governance models for realizing Society 5.0 as posted on METI's website. The red and bold parts were provided by Investment Bridge Co., Ltd.

In addition to these applications that are already under development, there are many areas where AP (Artificial Perception) technology will be applied and integrated in the future by supporting various advanced technologies, and it is expected that AP (Artificial Perception) technology will be implemented in society at a speed beyond what was previously expected.

【1-4 Business content】

Kudan has issued a license for Kudan SLAM, a software for integrating such algorithms as SLAM, which is the mission-critical technology of AP, into hardware, and grants it to customers.

It is essential to learn about AP (Artificial Perception) and SLAM to understand the business and technological superiority of Kudan. Below are descriptions of AP and SLAM.

<What is AP?>

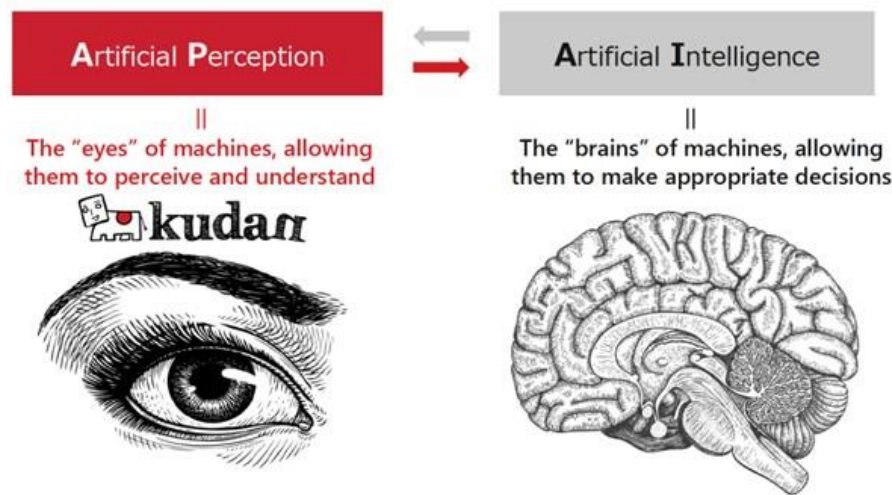
Artificial perception (AP) is a technology put forward by Kudan Group that is carrying out research and development thereof.

The evolution of AI (artificial intelligence), a technology that replaces the human brain, is remarkable.

However, the recent evolution of AI is mainly limited to "Internet AI" that does not directly operate in the real (physical) space. At the same time, the demand for "embodied AI" that can directly affect the real space is expected to increase significantly in the future. Machines (computers and robots), which have remained in the Internet space for a long period of time, are heading toward autonomous functions in the real space.

However, autonomous actions and functions of machines cannot be realized by AI alone. It can only be realized by mutually linking and complementing AI (Artificial Intelligence) with the advanced technology AP (Artificial Perception), which is equivalent to the "eyes" for understanding the surroundings. AP (Artificial Perception) is an essential technology that gives machines advanced visual capabilities like human eyes.

With the evolution of AI, the need for AP technology that connects machines and the real world is expected to grow even more in the future.



(Taken from the reference material of the company)

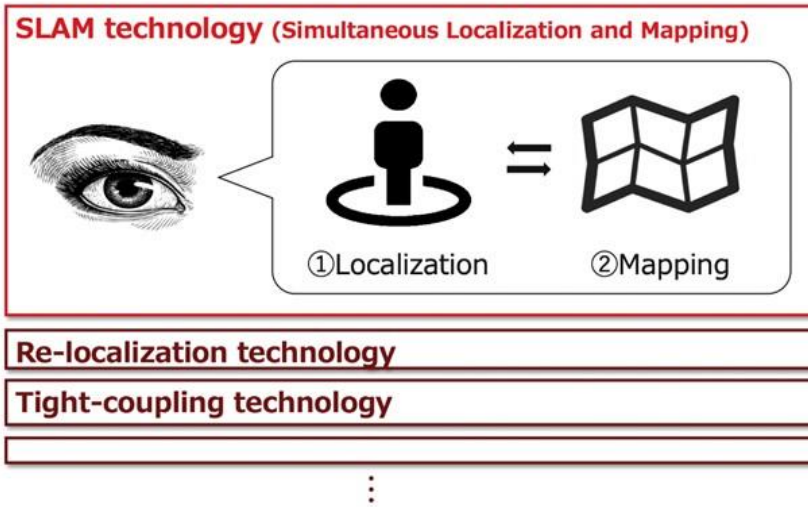
<What is SLAM?>

"SLAM: Simultaneous Localization and Mapping" plays a key role in enabling the AP (Artificial Perception) to fully demonstrate its required capabilities.

SLAM is a technology for each computer to concurrently "estimate the self-location (localization: checking where you are)" and "produce an environmental map (mapping: checking your surroundings)" in the real environment based on data input from external sensors, such as cameras and lidar.

It is possible to record how you have travelled in a new environment while producing a map (tracking) and recognize where you are based on a previously produced map (re-localization).

Unlike GPS and beacons, which detect the position from external radio waves, it recognizes its own position in a standalone manner. Thus, it can be used in a wider range of environments, situations, and use cases.



(Taken from the reference material of the company)


Taking a car applied with the SLAM technology as an example, the technology localizes the car based on a computer program of mathematically processing the distance that the car has travelled, camera images, and sensor information provided by Lidar, which is a sensor using laser light, and outputting three-dimensional information (such as the direction, distance, and size) and kinesthesia (such as the location and movement) on a real-time and precise basis and, at the same time, makes a three-dimensional map based on data on the surroundings amassed by the sensors.

In the case of cars, SLAM enables drivers to obtain basic information for safe travel by car by using a three-dimensional map drawn from time to time by the technology while driving cars, even if they have no information in advance on road conditions (such as the location of cars driving in the front, back, left, and right of their cars, how fast the cars in all directions drive, the road width, and the number of road lanes).


Differing from GPS, which detects a position with external radio waves, and beacons, it recognizes the self-position in a stand-alone manner, so it can be used in a broader range of environments, situations, and cases.

SLAM is the most critical technology for AP, and what are extremely important are precision and processing speed when it comes to ensuring the safety in autonomous cars. Such technological issues have been pointed out as obstacles to using SLAM for general purposes.

In this regard, GrandSLAM offered by the Kudan Group is comprised of three different SLAM algorithms, each of which has its own unique strengths.

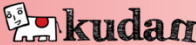


KdVisual (Indirect SLAM)
for mainly Indoor usecase




Camera **ArtiSLAM (Direct SLAM)**
for mainly Outdoor usecase

and/ or





KdLidar (3D-Lidar SLAM)
for Indoor & Outdoor usecase





LiDAR


Possible to fuse



IMU


GNSS


Odometry


Marker


ToF


Radar

(Taken from the reference material of the company)

Kudan Indirect Visual SLAM, for example, is capable of processing information over 10 times faster with less processing power than the most prominent open-source software of camera-based SLAM technology. Compared to other solutions that can generally give only centimeter-level localization precision, such as 5 cm, the precision of Kudan Indirect Visual SLAM can be as small as millimeters. By combining these algorithms, etc., the company aims to further improve the function with higher speed and higher precision both indoors and outdoors, using multiple sensors, such as cameras and Lidar, together by integrating the systems through clock synchronization between the sensors (a process called tight coupling).

This technological superiority has been enhanced further by the acquisition of Artisense Corporation as its subsidiary as mentioned later.

Kudan began offering Kudan Indirect Visual SLAM under the name of Kudan SLAM in the term ended March 2018. Then, it started to provide Kudan 3D-Lidar SLAM in March 2020. The company has been striving to broaden the customer base in the following three areas:

Area	Example customers
Augmented reality (AR) and virtual reality (VR) application area	Optical sensor manufacturers, optical equipment manufacturers, mixed reality (MR) glasses manufacturers, telecommunications equipment manufacturers, electrical equipment manufacturers, e-commerce platforms, computer games producers etc.
Robotics and IoT area	Optical equipment manufacturers, heavy industrial and industrial robot manufacturers, electrical equipment manufacturers, transportation equipment manufacturers, signal processing internet protocols (IPs), etc.
Application area targeting cars and maps	Car components manufacturers, digital map companies, spatial information consulting companies, etc.

Like this, having both Visual SLAM and Lidar SLAM, Direct SLAM and Indirect SLAM in Visual SLAM, and having a hybrid technology combining them is a major strength of the company.

<Growing number of fields in which AP can play roles>

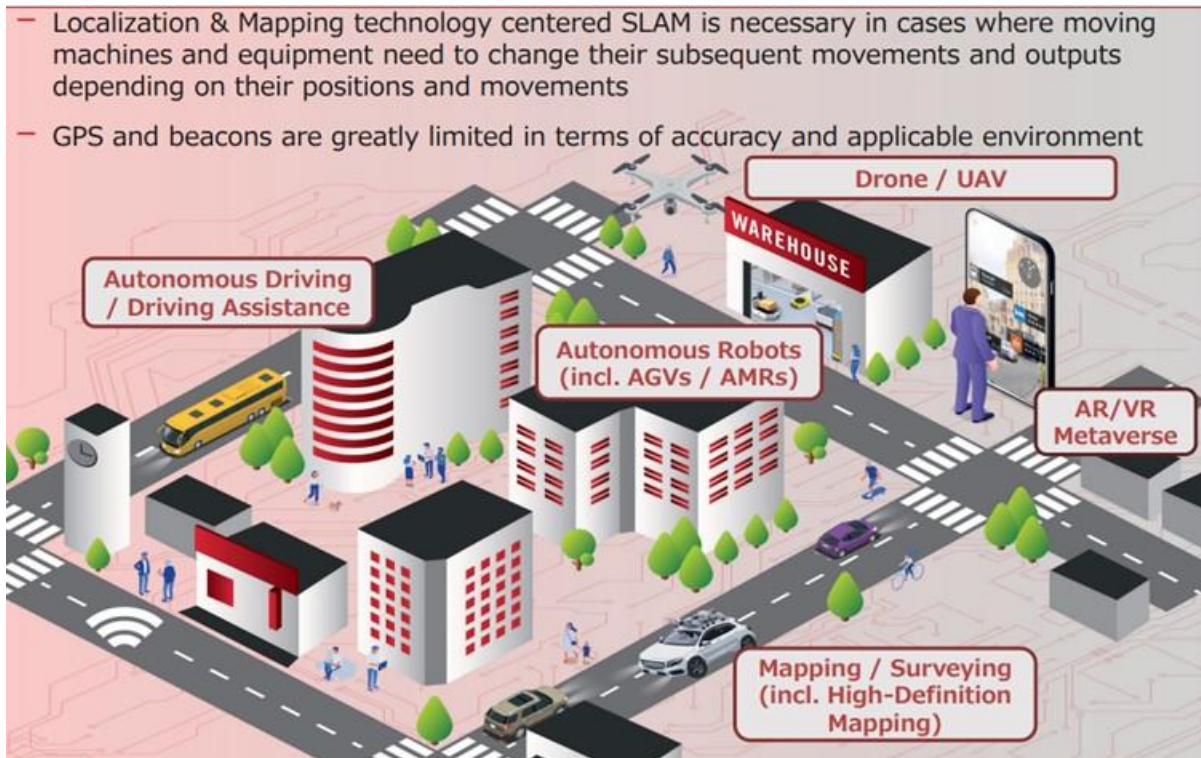
Using one of the existing technologies called computer vision (a set of base technologies of sensor and image processing mainly on a two-dimensional basis) as the foundation after reconstructing it, Kudan has developed its own unique AP technology.

As AP is the base technology necessary for every kind of device that uses cameras and three-dimensional sensors, the company expects that it will be the base technology adopted to diverse next-generation solutions on a cross-cutting basis.

It has been a technology essential for automatic control of all autonomous machines as robotics in a broad sense, including industrial robots, domestic robots, next-generation mobility such as cars, and flying machines such as drones, just to name a few.

It will also be required for spatial perception in AR and VR that will serve as user interfaces of next-generation computers.

In addition, the technology will be applied to an extremely wide range of purposes as the base technology for next-generation digital maps, dynamic maps (a dynamic mapping system that swiftly reflects the conditions of the reality environment), digital twin (information on the virtual space synchronized with the reality environment on a real time basis), and the like.



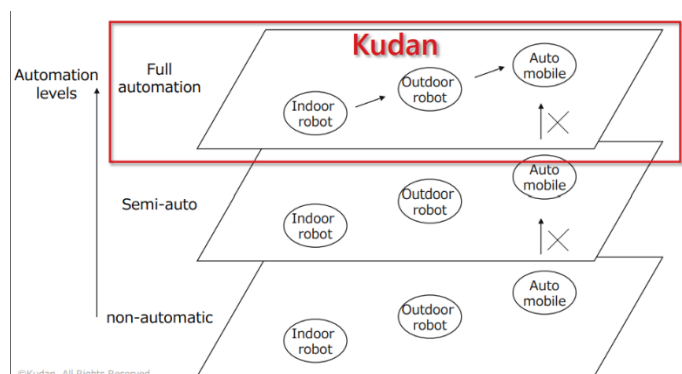
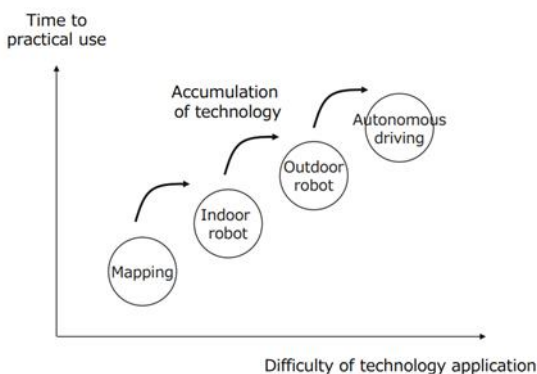
(Taken from the reference material of the company)

【1-5 The company's vision】

<Technical Strategy and Management Strategy>

◎ Technology Strategy

The company is targeting only achieving full automation. Full automation is difficult to achieve by merely accumulating non-automated and semi-automated technologies. By focusing on this, the company is accumulating technology while achieving full automation in each area in stages, "mapping" → "indoor robot" → "outdoor robot" → **"autonomous driving,"** in order to realize applied technology with a high degree of difficulty.



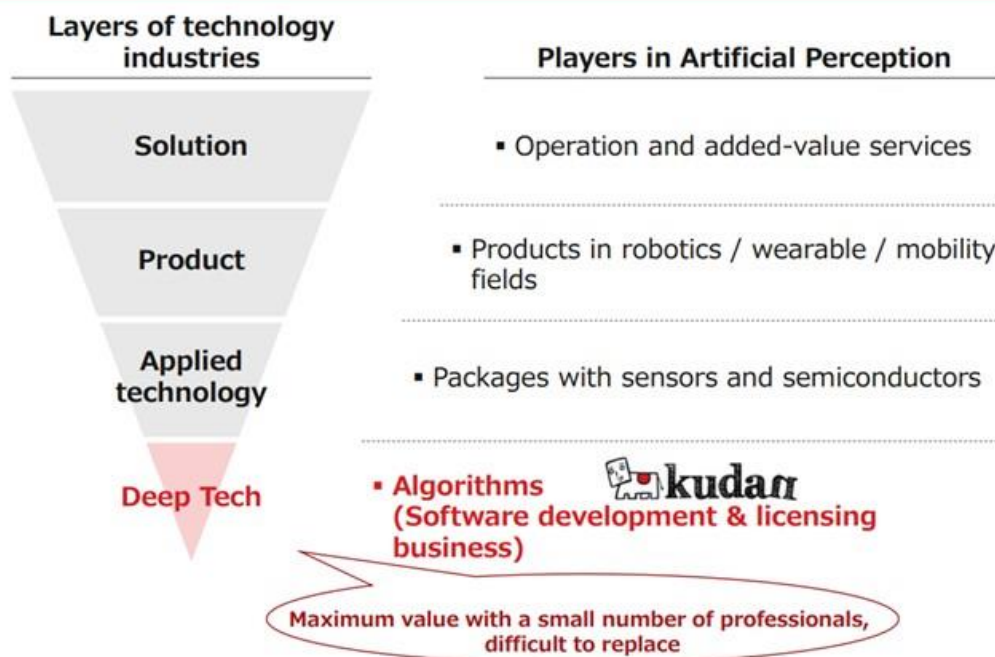
(Taken from the reference material of the company)

© **Management Strategy**

Based on the technology strategy, the company is focusing on algorithm research, software development, and licensing in Deep Tech, which is equivalent to the fundamental technology located in the deepest technological layer below solutions, finished products, and applied technology.

With overwhelming technological strength as its weapon, the company is promoting customer acquisition globally and aiming for "maximization of corporate value with a select few employees" and "positioning that is difficult for customers to replace."

"ARM-like position" targeted by our small number of professionals



(Taken from the reference material of the company)

【1-6 Competitive superiority】

(1) Technological features

Kudan believes that its AP technology has enormous advantages in taking in not only the existing demand for product development but also demand for research and development on highly novel and complex future technologies, because the AP technology can help the company strategically take in technological demand fueled by continuous advancement and wider applications of the technology in mid-/long-term.

According to the company, the AP technology has the following five features.

Kudan can flexibly fulfill future demand, which is expected to grow and be diverse, by combining their sophisticated and flexible research and development capabilities that they cultivated by focusing on the AP field:

Feature	Overview
(1) Uniqueness of the algorithms	<p>The Kudan Group possesses diverse families of technologies that consist of uniquely developed algorithms.</p> <p>Regarding how to perceive image feature points (fairly noticeable local areas in an image) that provide the basis for perceiving three-dimensional geometric structures at an advanced level, for example, the company has developed a unique, high-speed and greatly precise method by integrating and hybridizing a high-speed perception method and a highly precise and stable perception method. Furthermore, the density of feature points perceiving within an image can be adjusted flexibly to optimize the precision of perceiving three-dimensional structure (a set of three-dimensional feature</p>

	<p>points) and the processing speed, according to the practical application environment.</p> <p>In addition, a wide range of unique mathematical models that guarantee the feasibility of the technology are integrated, including optimized calculation that increases the precision of a group of three-dimensional feature points perceived sequentially in a three-dimensional manner, and a high-speed matching method with already-known, stored data.</p>
<p>(2) Flexibility and powerful performance</p>	<p>The uniqueness of the algorithms allows high-speed processing (with a light calculation load) as well as realizes great perception precision (which means that deviation from a true value is slight) and robustness (which indicates that the technology performs stably regardless of the environment and conditions in which it is used).</p> <p>In addition, the AP technology will be able to deliver strong performance that is optimized for a myriad of practical applications as it is designed in a manner that allows users to make detailed adjustments to the perception precision, robustness, processing speed, data size, and other individual functions according to the conditions under which the technology is used and required specifications.</p>
<p>(3) Flexibility in sensor use</p>	<p>As limiting the number of sensors can narrow the scope of applications of the AP technology, the Kudan Group's technology is designed to be compatible with various sensors.</p> <p>Specifically, it can function with a variety of cameras, the technology can be adjusted flexibly according to the number of cameras (such as monocular cameras, binocular cameras, and multiple cameras), and the data read format of optical sensors (such as whether to read data sequentially or simultaneously).</p> <p>Besides cameras, the technology can also be combined with a multitude of sensors, including three-dimensional sensors (such as Lidar and Time of Flight (ToF)), internal sensors (such as inertial measurement unit (IMU) and machine odometry), and position sensors (such as the Global Positioning System (GPS) and Beacon), which will allow advanced application of the technology while taking advantage of the strengths of each sensor.</p>
<p>(4) Flexibility in arithmetic processing environments</p>	<p>Flexibility in arithmetic processing platforms is also an important factor for applying the AP technology to a wider range of fields.</p> <p>As the Kudan Group's technology can work in multifarious arithmetic processing environments, it can be compatible with all kinds of processor designs and thus can speed up calculation processes by optimizing the software according to the kind of processor used (such as a central processing unit (CPU), a digital signal processor (DSP), and a graphics processing unit (GPU)).</p> <p>It can also function in a wide range of system environments through porting a software to major operating systems (such as Linux, Windows, MacOS, iOS, and Android).</p>
<p>(5) Flexibility in using part of the function</p>	<p>Complex fusion with other technologies is necessary for advanced applications of the AP technology. Parts of the function (software modules) of the Kudan Group's technology can be selected so that they are flexibly integrated into customers' existing software.</p> <p>The degree of dependence on processor designs (the degree of abstraction of software) of each part (software module) of the technology's function varies, and therefore it can be optimized flexibly either at a semiconductor level (with a lower abstraction degree) or at a software application level (with a higher abstraction degree).</p>

BRIDGE REPORT



(2) Global group of experts on AP

Researchers and engineers specializing in SLAM are a handful in the rare computer vision field. Among these, the company has many top-notch personnel with a doctoral degree, and as a group of AP professionals, it has built a strong foundation in both technology and business on a global basis.

Following the establishment of the Kudan Group in the UK in 2011 and the opening of its Tokyo office in 2014, the company invested in Artisense Corporation (Germany) in 2020 and made it a subsidiary in the following year 2021.

The acquisition of Artisense, a world-leading technology company, as a subsidiary and the deepening of the relationship with Professor Daniel Cremers of the Technical University of Munich further strengthens the company's competitiveness in terms of human resource acquisition and technology development.

(Overview of Artisense Corporation)

Artisense Corporation was founded in 2016 jointly by Professor Daniel Cremers, who has delivered the world's best research results as the leader of the Technical University of Munich (TUM) that has a world-leading research group in AI and computer vision and as a leading expert on the autonomous driving technology, and Mr. Andrej Kulikov, a serial entrepreneur.

With such fields as autonomous driving, robotics, AR and VR, and drones being its application areas, Artisense Corporation provides AP algorithms that perceive the space and location, taking pride in its capability of putting camera-based visual SLAM into practice on a commercial level.

(3) Outstanding business achievements

The number of players in the market is more limited as M&A by major technology companies continues for companies that specialize in SLAM or have SLAM as their core business.

In this environment, the company is far ahead of existing companies in terms of the breadth of technology it offers, its track record of projects, and its recognition.

To date, the company has achieved development and partnerships with many top global companies and has been highly evaluated by the world's leading companies.

Development projects and partnership with global leading players have been increasing



Timing	Main target applications and project overview	
FY 20	May. Robotics) Partnership with Thales group for next-gen tracking system development	THALES
	Aug. Mobility) Signed with Japan Unisys to collaborate as Business Scaling Partner	UNISYS
	Sep. Mobility) Partnership with Macnica to develop new value-added solutions for mobility business	MACNICA
FY 21	Robotics, Mapping) Partnership with Ouster. Provide localization and mapping solutions with Lidar	OUSTER
	Nov. AR) Develop RGB-D SLAM on smartphones with ToF sensor with Sony Semiconductor Solutions	SONY
	Jan. Robotics, Mapping) Partnership with Cepton on Lidar-SLAM and joint exhibition demo	CEPTON
	Robotics, Mapping) Partnership with Velodyne on Lidar-SLAM	Velodyne Lidar
FY 22	May. Robotics) Launch SLAM library for Qualcomm® Robotics RB3 Platform with their technical support	Qualcomm
	Robotics) Joint development of 3D SLAM demo application with Analog Devices	ANALOG DEVICES
	Nov. Robotics) Partnership with Vecow to jointly offer integrated solution for autonomous mobile robots	VECOW
	AR, Mobility) Artisense released Automotive AR navigation demo with HERE technologies and NNG	HERE NNG
FY 23	Dec. General) Achieved 40% image process acceleration with Synopsys ARC EV processor IP on Kudan SLAM	SYNOPSYS
	Mar. General) Joined NVIDIA Inception Partner Network	NVIDIA
	Apr. AR) Released utilization of Kudan SLAM in NTT docomo's developing AR cloud	docomo
	May. Robotics) Partnership with robotics developer UGO to integrate Kudan SLAM into robotics and joint sales	UGO
FY 24	Jul. Mapping) Signed a Developing License General Agreement with BIMEXPERTS and develop joint solutions	BIMEXPERTS
	Aug. Robotics) Partnership with ADLINK, development of AMR, integration of Kudan SLAM into robotics, joint sales	ADLINK
	General) Joined Texas Instrument's partnership network in robotics	TEXAS INSTRUMENTS
	Oct. Autonomous Driving) Participation with Renault and other companies in ERASMO, autonomous driving project by EU research institute	HP OUSTER
FY 23	Oct. Robotics) Adopted as a commercial SLAM for Edge Insight, Intel's platform for AMR	intel
	Robotics, Mapping) Partnership with Innoviz to promote digital mapping project	INNOVIZ
FY 24	Apr. Robotics) Partnership with Cadence to enhance SLAM performance for robotics	cadence

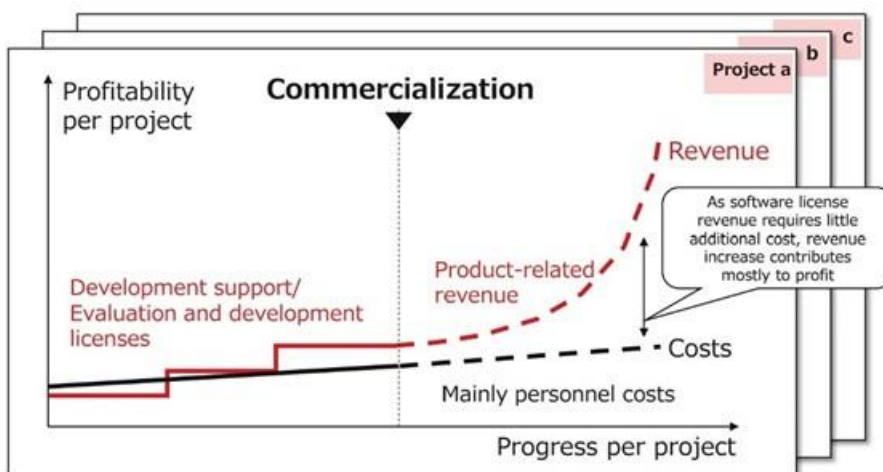
(Taken from the reference material of the company)

【1-7 Business model】

(1) Acceleration and expansion of customer commercialization

Currently, the majority of projects are in the evaluation and development phase, and the business is in the red due to upfront investment in research and development expenses.

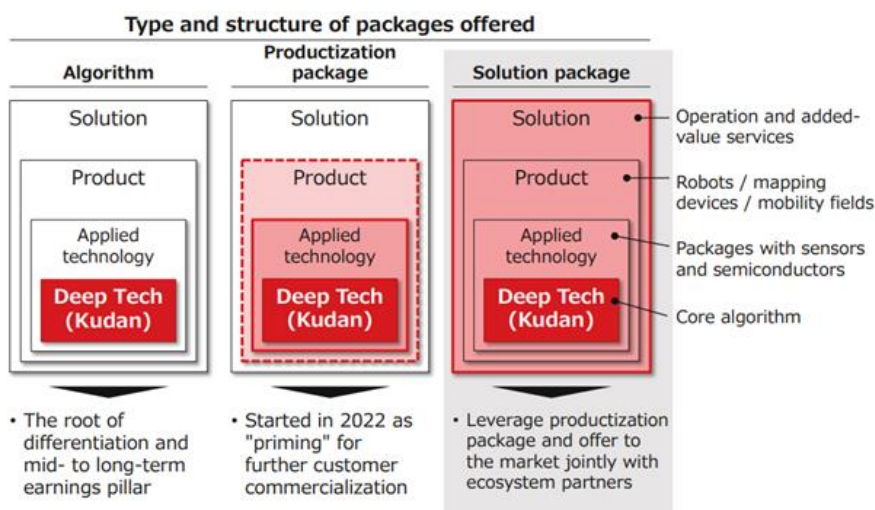
A certain level of profitability and growth is expected for evaluation and development licenses/customer development support, and product-related revenue are expected to increase significantly as technology penetrates the market through the spread of customer products. Sales after commercialization by customers are mainly software license income. As a result, additional costs are negligible, and the increase in sales will contribute to profit. Therefore, a dramatic increase in profit can be expected.



(Taken from the reference material of the company)

(2) Operation of the solution business

In response to growing market demand, the company will work with ecosystem partners to offer solution packages to end customers, including operations and value-added services, in addition to packages for products.



(Taken from the reference material of the company)

First, the company will develop its DX infrastructure solution business by leveraging its mapping product packages.

In response to growing DX demand in Europe for municipalities and public infrastructure (survey and maintenance of infrastructure, surveying for construction, registration of street trees and green spaces, etc.), the company will provide integrated solutions ranging from digitization to database management. The company aims to expand sales to reach the scale of 100 million yen in the short term.

The company signed a basic agreement with STS Group, headquartered in Hungary, to become an ecosystem partner for this purpose, and it plans to jointly develop a solution business for digital asset infrastructure in Europe with STS Group as a strategic business partner.

BRIDGE REPORT



Founded in 2002, STS Group is a plant engineering and turnkey solution provider for renewable energy. The company designs, constructs, and operates power generation facilities and other lifelines for renewable energy sources such as solar and wind power in Hungary, Germany, Central and Eastern Europe, the Balkans, and the Baltic States.

Global demand for digital twins and spatial DX that match the mapping applications of Kudan's technology is expected to create a strong market in the future.

Growing demand for DX for municipalities and public infrastructure
Public infrastructure survey and maintenance

Building Survey Green Cadastre

Provide integrated solutions from digitization to database management

Mapping equipment / scanning 3D digitization by point cloud

Information assignment / Database management

Expected Impact

- Data collection efficiency: 10~20x
- Data use efficiency: 2~5x
- Realization of innovation
 - Expand assets that can be managed
 - New business through information sharing
 - Work decentralization, etc.

Industry 4.0 (~10T Yen)

- The "Digital Twin," one of the core technologies of the "Industry 4.0" has evolved.
- Major manufacturing companies such as Deutsche Bahn, Siemens, Mercedes, Bosch, etc. announced their multi-billion euro digital twin implementation plans one after another

The comprehensive national development plan for digital lifelines (7.7T Yen)

- A large-scale public-private sector project led by the Ministry of Economy, Trade and Industry (METI) to promote the automation and digitization of social infrastructure from FY2024
- Promote the implementation of spatial DX technologies including 3D map, data connection infrastructure, infrastructure management DX, autonomous driving support infrastructure

Digital Compass 2030 (~20T Yen)

- The EU government will take the lead in promoting the development of Europe's digital infrastructure by 2030, utilizing AI, IoT, and other technologies

Digital China (100T Yen)

- A government-led project to promote the digitization of the entire social economy, including 3D map creation and spatial digitization toward 2035
- Collaborating with many domestic companies such as Baidu and Beijing Automotive Group, as well as overseas companies such as Audi

XX Trillion Yen Budget by each governmental policy

(Taken from the reference material of the company)

2. Second Quarter of the Fiscal Year ending March 2024 Earnings Results

【2-1 Overview of the consolidated results】

	FY 3/23 2Q	Ratio to sales	FY 3/24 2Q	Ratio to sales	YoY
Sales	155	100.0%	73	100.0%	-52.6%
Gross Profit	86	56.1%	55	75.2%	-36.4%
SG&A	399	257.4%	451	613.7%	+13.1%
Operating Income	-312	-	-395	-	-
Ordinary Income	-81	-	-111	-	-
Net Income	-84	-	-117	-	-

*Unit: million yen. Net income is profit attributable to owners of the parent. Hereinafter the same shall apply.

Sales dropped and loss augmented

Sales declined 52.6% year on year to 73 million yen, and operating loss was 395 million yen (a loss of 312 million yen in the same period of the previous year). Although the business, centered on product-related projects, is progressing smoothly, sales in the first half of the year decreased because the majority of sales from evaluation and development projects and product-related sales are expected to come in the second half. Operating loss augmented as SG&A expenses increased 13.1% year on year due to continued business expansions as well as system expansions.

Recurring loss was 111 million yen (81 million yen loss in the same period of the previous year). Foreign exchange gains increased to 286 million yen from 232 million yen a year earlier.

【2-2 Financial standing and cash flows】

◎ Balance sheet indicating major items

	End of Mar. 2023	End of Sep. 2023	Increase/ decrease		End of Mar. 2023	End of Sep. 2023	Increase/ decrease
Current Assets	991	925	-66	Current Liabilities	241	257	+15
Cash and deposits	852	805	-46	Total Liabilities	248	264	+15
Noncurrent Assets	16	24	+8	Net Assets	759	685	-74
Tangible Assets	0	0	0	Capital	345	11	-334
Investment, Other Assets	16	24	+8	Retained Earnings	-332	112	+445
Total Assets	1,008	949	-58	Total Liabilities and Net Assets	1,008	949	-58

*Unit: million yen.

Total assets decreased 58 million yen from the end of the previous period to 949 million yen, mainly due to a drop in cash and deposits. Net assets decreased 74 million yen year on year to 685 million yen because of a decrease in capital stock, an increase in retained earnings, and a larger loss from the foreign currency translation adjustments.

As a result, the equity ratio decreased by 3.3 points from the end of the previous fiscal year to 71.7%.

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◎ Cash Flow

	FY 3/23 2Q	FY 3/24 2Q	Increase/decrease
Operating Cash Flow	-312	-364	-51
Investing Cash Flow	-2	-13	-11
Free Cash Flow	-314	-377	-62
Financing Cash Flow	814	306	-508
Cash and equivalents	1,122	805	-317

*Unit: million yen

The cash position declined.

[2-3 Business Topics]

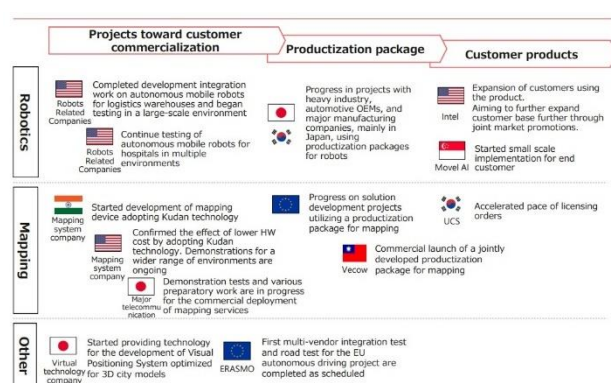
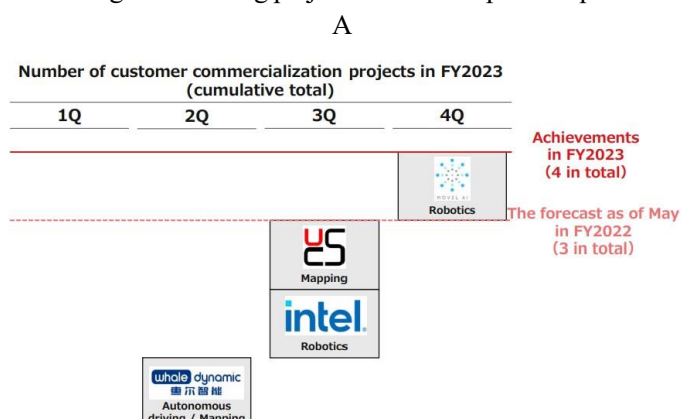
(1) Progress in customer commercialization

Commercial-level customer commercialization is steadily progressing.

In FY3/23, the number of projects, mainly for robotics and mapping, totaled four (see figure below), exceeding the three projects forecast at the beginning of the fiscal year.

Of these, the full-scale adoption of SLAM in Intel's semiconductor products was the first commercial SLAM in the world.

While narrowing down its focus areas to robotics and mapping, which are expected to grow quickly in the future, the company is accumulating the following projects for the next phase of product commercialization by customers.



(Taken from the reference material of the company)

(2) Signing a basic agreement with Whale Dynamic for capital and business alliances

In September 2023, the company signed a basic agreement for capital and business alliances with business partner Whale Dynamic Co. Ltd., which develops autonomous driving solutions in China.

(Whale Dynamic Overview)

Whale Dynamic was established in October 2015. David Chang, the founder and CEO of Whale Dynamic, was the senior product manager of Apollo, the largest self-driving project of Baidu, a major Chinese IT company, and led its development. He holds a master's degree from the University of Cambridge, UK.

Based on its L4 and L5 unique autonomous driving technologies, the company is developing and commercializing a wide range of products for autonomous robots and **autonomous driving** and is widely expanding its business not only in the rapidly developing Chinese market, but also in the global market.

The company has the global EV manufacturer BYD as a customer and is the only company in the world to be a member of both Baidu's Apollo, the global open-source ecosystem for **autonomous driving**, and The Autoware Foundation, the world's first international industry organization dedicated to setting industry standards for **autonomous driving** operating systems.

(The purpose of the alliances)

Whale Dynamic began offering a robot (autonomous delivery vehicle) integrating Kudan's 3D-Lidar SLAM technology and related HD

mapping toolset in July 2022 and has been promoting market sales mainly in the Chinese market, which is rapidly advancing the demonstration of advanced **autonomous driving** technology through a public-private system.

As Whale Dynamic's track record in the Chinese market expands, demand for its solutions in global regions such as Europe and the Middle East grows, as does the prospect of opportunities for Kudan to offer its technology in a broader range of Whale Dynamic products, such as **autonomous driving** for passenger cars.

Based on this business progress, the two companies agreed to form the following business and capital alliances to strengthen the cooperative framework and jointly promote the sales of Whale Dynamic's products and the spread of Kudan's technology.

(Details of the agreement)

(1) Business Alliance

Kudan plans to enter into a product license agreement with Whale Dynamic for a total of 300-400 million yen in the term ending March 2024 and the term ending March 2025, of which 240 million yen has been confirmed for the agreement during the term ending March 2024.

In addition, Kudan will invest 500 million yen (400 million yen of which is confirmed as above) in Whale Dynamic as growth capital for global expansion and product development for **autonomous driving**, aiming to accelerate the spread of Whale Dynamic's products, add to and continuously expand product license sales.

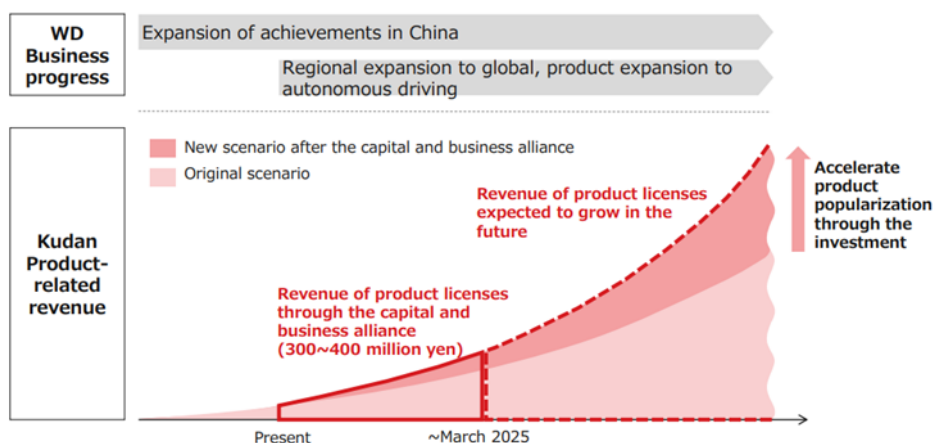
In addition to ERASMO in Europe and major automotive OEM projects in Japan and Europe, the two companies will expand automatic driving-related technology collaboration in other regions, such as China and the Middle East, and jointly conduct global marketing, project development, and support.

Furthermore, the two companies plan to expand their product lineup from mapping (in-vehicle) and robotics (autonomous vehicles) to **autonomous driving** for general passenger vehicles in the larger market and to jointly develop the applications of Kudan's technologies.

(2) Capital Alliance

The company will invest a total of 500 million yen in Whale Dynamic (including group companies) in the fiscal years ending March 2024 and March 2025 (estimated to be approximately 10% of the total number of shares issued).

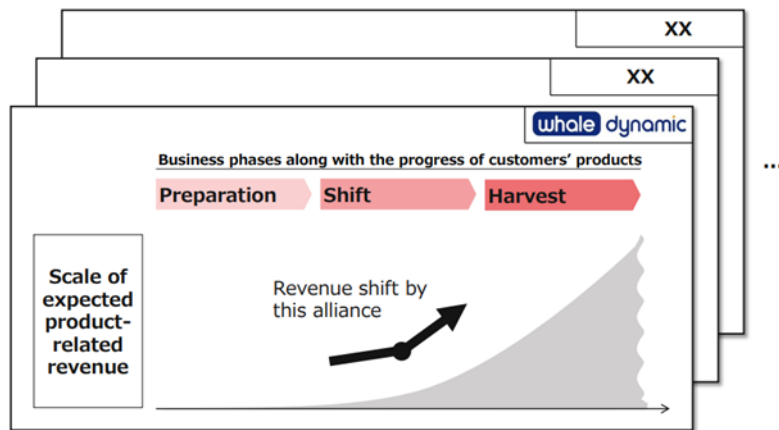
The agreement is not legally binding, and the two companies plan to work out the details of the final agreement based on the basic agreement, with the intention of concluding the final agreement in stages depending on the progress of both parties' businesses and their cooperative structure. If they resolve to enter into a final agreement, the details of the agreement will be disclosed.



(Taken from the reference material of the company)

(Future expansion)

Beginning with Whale Dynamic, the company will seek to expand product-related sales by promoting the same business-stage transformation with partners in all the projects where customers do product commercialization.



(Taken from the reference material of the company)

(3) Completed Integration of Hybrid Technology into Customer Products

The world's first commercial SLAM technology to successfully hybridize indirect method SLAM and direct method SLAM.

By integrating the advantages of both, "indirect SLAM" with its high processing speed and versatility and "direct SLAM" with its precise recognition and high stability, a significant improvement in basic performance has been achieved and is expected to contribute to the expansion of the customer base in a wider range of application cases.

In addition to the application of this technology in customer projects, the integration of this technology into customer products has been completed, and is expected to contribute to product-related sales in FY 03/24 and beyond.

3. Fiscal Year ending March 2024 Earnings Forecasts

【3-1 Earnings forecasts】

	FY 3/23	Ratio to sales	FY 3/24 Est.	Ratio to sales	YoY
Sales	332	100.0%	520	100.0%	+56.3%
Operating Income	-598	-	-560	-	-
Ordinary Income	-394	-	-520	-	-
Net Income	-413	-	-550	-	-

*Unit: million yen. The forecasts were those released by the company.

There is no change to the earnings forecast; expect to increase product-related sales by focusing on focused areas

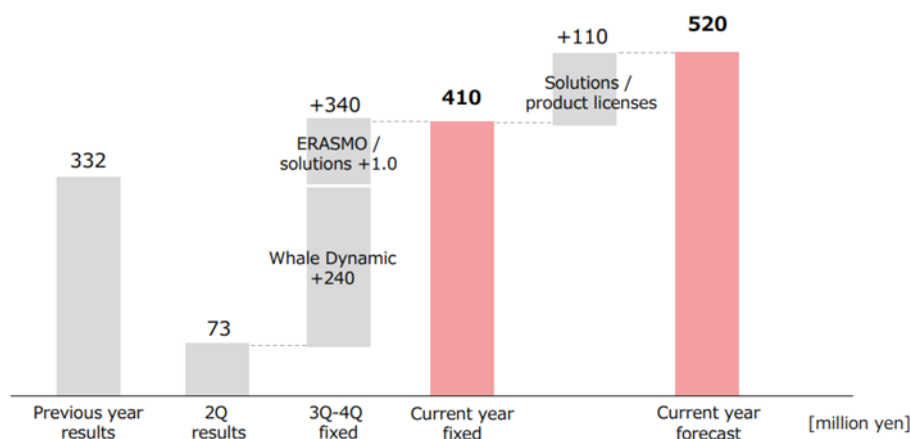
There is no change to the earnings forecast. For the term ending March 2024, it is forecast that sales will increase 56.3% year-on-year to 520 million yen and operating loss will be 560 million yen, almost unchanged from the previous fiscal year.

It is expected that the narrowing down of focus areas will prove effective, leading to the expansion of product-related revenue and that overall sales will also grow steadily.

At present, confirmed sales are 410 million yen, including 0.7 billion yen in the first half and 340 million yen in the second half. Sales are up 24% from the previous year and 79% of the full-year forecast, indicating that the company is on track to achieve its goal. The company aims to achieve the budget by accumulating development and solution projects using the package for mapping and robot products, which is scheduled for official release in the third quarter, as well as product license sales.

On the other hand, costs are projected to increase year-on-year due to the development and sales of packages for products as well as the reinforcement of the system to expand product-related sales.

As a non-operating income, the company expects to continue receiving R&D subsidies from overseas governments. Last year, it aimed to transform its earnings structure to become profitable in the term ending March 2024.



(Taken from the reference material of the company)

【3-2 Outlooks and initiatives】

Regarding the forecast of the number of commercialization cases, we expect the number of commercialization cases to be the same or higher this fiscal year as in the previous fiscal year, but we plan to proceed in the future with the content of disclosure appropriate to each stage of progress, rather than the number of commercialization cases.

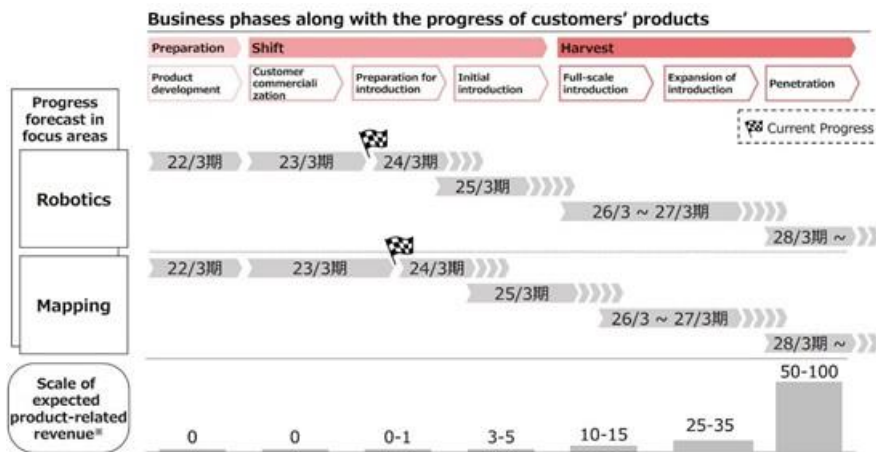
4. Growth Progress and Initiatives

[4-1 Short- and Medium-term Growth]

1) Growth vision

With the aim of expanding product-related revenue through the introduction and popularization of customer products, the company will continue to strategically promote measures to accelerate the progress of customer products, using the stage of development of customer products as an index.

Basically, the company focuses on massively expanding sales as a deep tech company. It recognizes that turning profitable is a transit point, and although it cannot clearly indicate its timing at this point, it believes that turning profitable should be achieved as a result of the process of expanding.



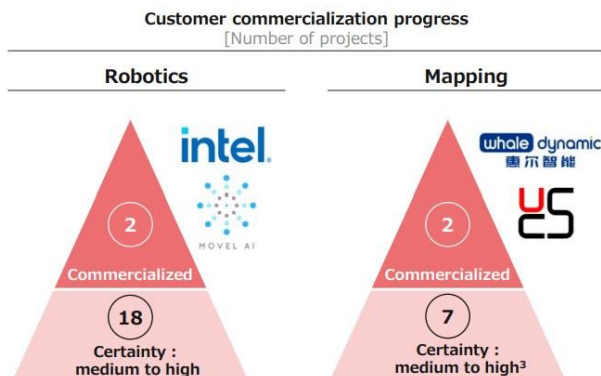
(Taken from the reference material of the company)

(2) Measures to Boost Product-Related Sales

◎ Narrowing down focus areas

With the start of product commercialization by customers, the company expects that sales associated with customer products (product-related sales) will become a pillar of growth over the medium to long term, and it decided to aim for the full-scale launch of such sales, narrowing its focus to two markets, robotics and mapping, where commercialization by customers has already been realized and where it expects rapid growth in the future.

For markets other than the two focus areas (e.g., **autonomous driving**), the company will narrow its focus based on medium- to long-term growth potential and will continue to focus on promising projects in the future.

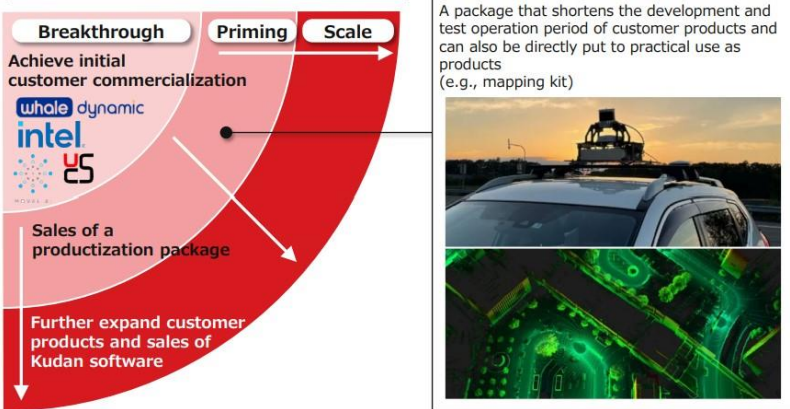


(Taken from the reference material of the company)

◎ Provide packages for products

After narrowing down the focus areas, the company will develop and provide packages for products aiming for it to become the catalyst to increase commercialization by customers further and expand sales of Kudan's software.

Expanding business by selling a productization package



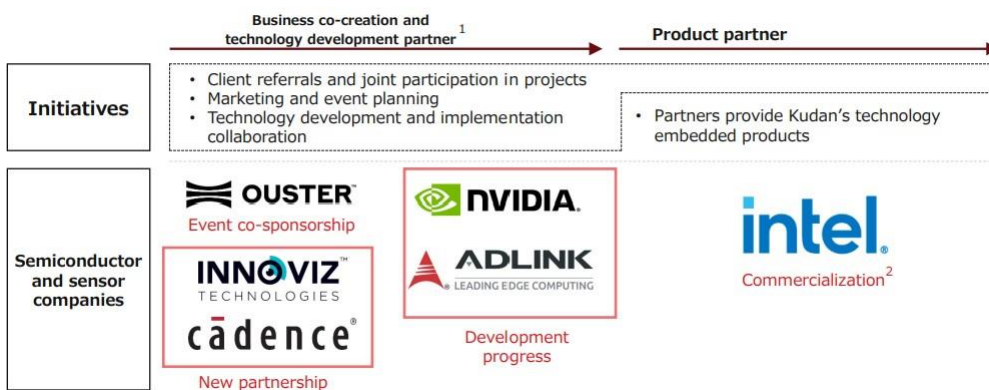
(Taken from the reference material of the company)

(2) Progress in Partnerships

In addition to the adoption of its technology in Intel commercial products, the company is expanding and deepening its partnerships with a group of major semiconductor and sensor companies, which are similarly expanding their ecosystems, and it is making significant progress towards industry standardization of its technology.

In the term ending March 2024, the company will work with Intel to enhance product functions, provide support for customer implementation, and conduct promotions to expand product sales.

In addition, the company will promote partnerships with semiconductor and sensor companies for further product commercialization and strengthen cooperation with system integrators that implement the company's technologies as solutions.



(Taken from the reference material of the company)

(3) Examples of demonstrations for next-generation technology

In areas other than robotics and mapping, which are the areas of focus, the company is working on a selection of demonstrations from a medium- to long-term perspective.

In addition to hybrid SLAM, the company has demonstrated location recognition with AI and sensor integration for **autonomous driving**, and has achieved effective results.

(Case Example)

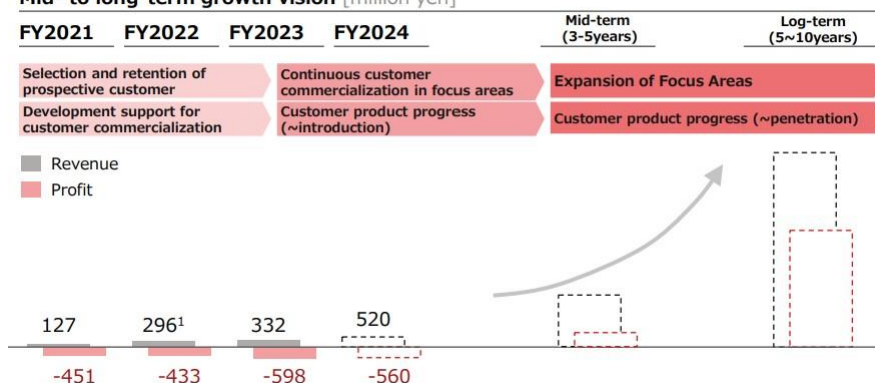
To establish vehicle location recognition technology in urban areas, which is difficult even with next-generation high-precision GPS, we are conducting demonstration tests in collaboration with GPS manufacturers and major European automobile companies.

【4-2 Medium/long-term growth】

The company aims to transform its profit structure as soon as possible through the continuous commercialization of its technologies by customers and promoting the progress of customer products.

It also aspires to dramatically increase profits by building up product-related sales significantly through the expansion of focus areas and market penetration of technologies by popularizing customer products.

Mid- to long-term growth vision [million yen]



(Taken from the reference material of the company)

5. Conclusions

The company is making steady progress in product commercialization by customers, with a total of four projects in the term ended March 2023, exceeding the three projects expected at the beginning of the term, mainly for robotics and mapping.

The company believes that the capital and business alliances with Whale Dynamic will be a turning point that will accelerate the pace of product-related sales growth.

Although the company will not disclose its forecast for the number of product commercialization projects from this fiscal year, we expect it to continue to publish releases on product commercialization projects and business progress on a quarterly basis.

Reference: Regarding Corporate Governance>

◎ Organizational form and compositions of directors and auditors

Organizational form	Company with audit and supervisory committee
Directors	8 directors, including 4 outside ones
Audit & Supervisory Board Member	3, including 3 outside the company

◎ Corporate Governance Report

Last updated in June 23, 2023

<Basic Policy>

Our company recognizes that it is indispensable to establish corporate governance, in order to improve our corporate value, maximize the profits of shareholders, and foster good relationships with stakeholders.

Under this recognition, the Managing Directors, other Directors, and employees of our company will strive to tighten corporate governance by understanding their respective roles and developing and operating internal control systems.

<Reasons for not following the principles of the corporate governance code>

We follow all the basic principles of the corporate governance code.

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