



Integrated Defense & Space Systems Business Plan

Member of the Board, Executive Vice President,
President and CEO,
Integrated Defense & Space Systems

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June 10, 2016

MITSUBISHI HEAVY INDUSTRIES, LTD.

1. Business Overview

- 1-1. Domain Statement
- 1-2. Business Overview
- 1-3. Review of FY2015
- 1-4. Major Projects and Orders in FY2015
- 1-5. Progress Status of 2015 Medium-Term Business Plan

2. FY2016 Business Policies and Strategies

- 2-1. Business Policies and Strategies
- 2-2. Forecast for FY2016

3. Business Strategies

- 3-1. Defense
- 3-2. Space systems

4. Summary

- 4-1. Forecast for FY2016
- 4-2. Medium- to long-term Business Policies and Strategies

1. Business Overview

- 1-1. Domain Statement
- 1-2. Business Overview
- 1-3. Review of FY2015
- 1-4. Major Projects and Orders in FY2015
- 1-5. Progress Status of 2015 Medium-Term Business Plan

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- 2-1. Business Policies and Strategies
- 2-2. Forecast for FY2016

3. Business Strategies

- 3-1. Defense
- 3-2. Space systems

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- 4-1. Forecast for FY2016
- 4-2. Medium- to long-term Business Policies and Strategies

1-1. Domain Statement

Philosophy of Domain Statement

Built from elements of Group Statement announced on May 9, 2016 relevant to Integrated Defense & Space Systems domain, as part of MHI Group Brand Story.

Concept behind Integrated Defense & Space Systems Domain Statement

MHI will continuously pursue new possibilities in integrated defense systems and space development in order to safeguard the lives of all people living on our planet.

Specifically, to realize peace and explore the infinite possibilities of the universe, MHI will develop global technologies in all spheres – land, sea, air, space and cyberspace – to move the world forward and shape a better future for all.



MOVE THE WORLD FORWARD

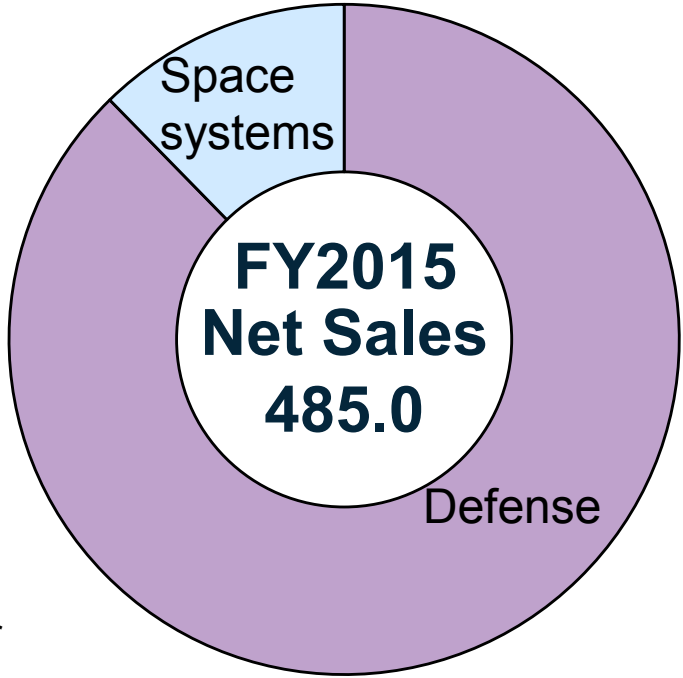
Preserving the richness of life on Earth is a far-reaching challenge. Whether by land, sea, air, space or cyber activity, our integrated global technology is engineered to protect the greater good of all. While building on a quickly-expanding space infrastructure that allows us to explore a boundless galaxy of uncertainty with both courage and strength.

Knowing that peace is always the goal, no detail is ever compromised. Whether it's defense systems such as submarines, military aircrafts, missile systems, tanks or rocket-launch services, we carefully design everything to safeguard society. Constantly expanding our space activities with vehicles and reliable systems that can go as far as the imagination. By focusing on the vast potential that surrounds us, our state-of-the-art technologies enable us to shape a better future by moving the world forward.

(In billion yen)

Defense

Space systems



F-2 Fighter



SH-60K Maritime Patrol Helicopter



PAC-3



SM-3



Type 10 Main Battle Tank



Submarine HAKURYU



H-II Transfer Vehicle (HTV) KOUNOTORI



H-II A Launch Vehicle



H-II B Launch Vehicle



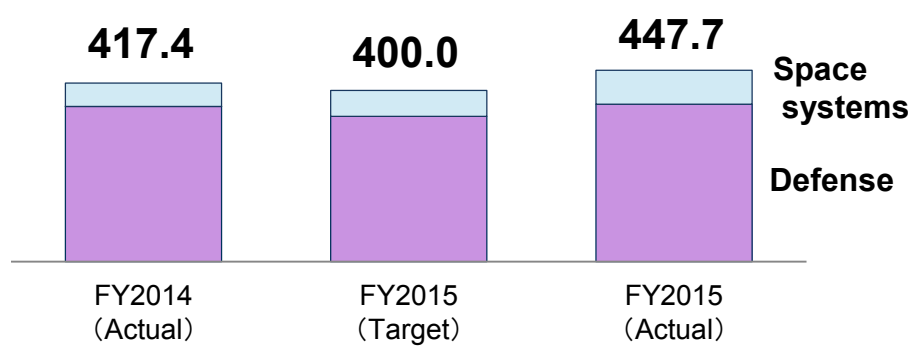
Aegis Destroyer ASHIGARA

(In billion yen)

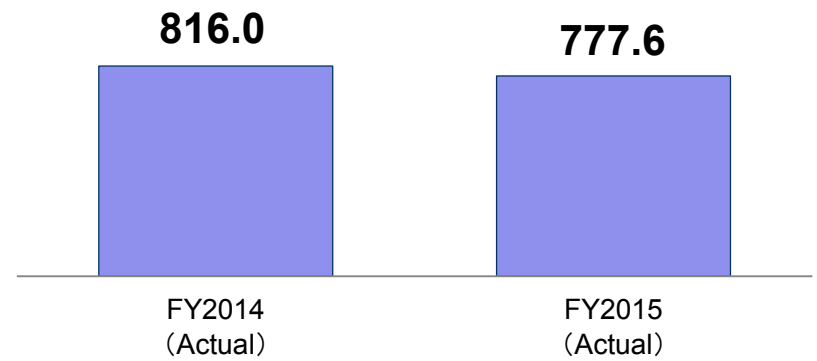
1-3. Review of FY2015

Continuing the stable business management character of our Integrated Defense & Space Systems operations, in FY2015 orders received, net sales and operating income all finished close to their year-earlier levels.

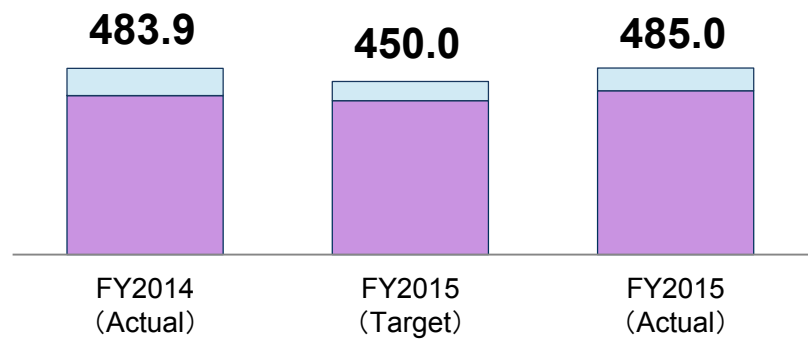
Orders received



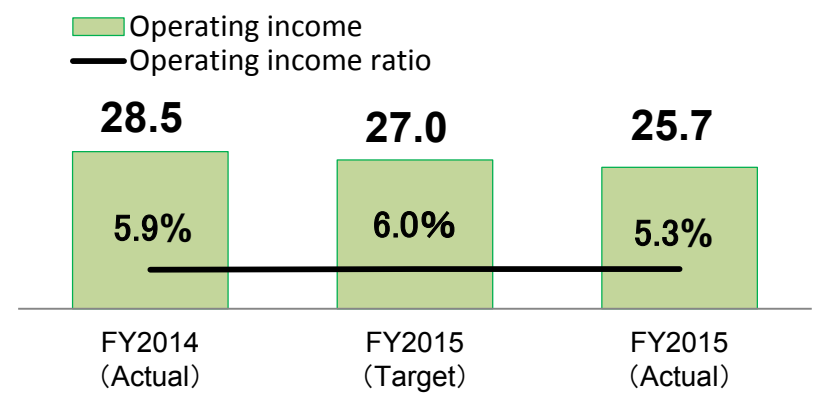
Orders Backlog



Net sales



Operating income



1-4. Major Projects and Orders in FY2015

Defense



Photo by Japan Air Self-Defense Force

Rollout of X-2 advanced technology demonstrator jet



Delivery of "Jinryu" submarine at Kobe Shipyard & Machinery Works

- Expertise in the design operation of control systems
- Control technologies with outstanding reliability and security cultivated in the defense and aerospace businesses

- State-of-the-art security technologies
- Information relating to global security threats

Conclusion of agreement to jointly develop cyber security technologies between MHI and NTT

Space systems

Domestic



The H- II A Launch Vehicle No.30

The H- II A Launch Vehicle No.30 successfully launched the X-ray Astronomy Satellite "ASTRO-H", bringing the H-IIA/H-IIB launch vehicles' success rate to 97.1%, the highest in the world.

Overseas



The H- II A Launch Vehicle No.29

The H- II A Launch Vehicle No.29 placed Telesat's "Telstar 12 VANTAGE" satellite into orbit, marking MHI's first launch of a commercial satellite for an overseas customer.



Signing ceremony in UAE

Continuing on from FY2014, MHI again received an order for launch services from a governmental agency in the UAE, marking the Company's fourth such order from an overseas customer.

1-5. Progress Status of 2015 Medium-Term Business Plan

(In billion yen)

	FY2015 (Forecast)	FY2015 (Actual)	FY2016 (Original Forecast)	FY2016 (Revised Forecast)	FY2017 (Target)
Orders received	400.0	447.7	400.0	400.0	400.0
Net sales	450.0	485.0	400.0	400.0	400.0
Operating Income	27.0	25.7	24.0	26.0	25.0
Operating Income ratio	6.0%	5.3%	6.0%	6.5%	6.3%

- Net sales held stable near 400 billion yen, and existing businesses continue to be strengthened.
- New markets and businesses are being developed, as preparations continue steadily toward future expansion.

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- 1-4. Major Projects and Orders in FY2015
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Market Environment

Defense

- The **“Medium-Term Defense Program (FY2014-FY2018)”** calls for the build-up of a **“Dynamic Joint Defense Force,”** accelerating the development and procurement of new equipment.
- Following the Cabinet’s approval of the **“Three Principles on Transfer of Defense Equipment and Technology,”** overseas orders will expand, especially those calling for international joint development.

Main equipment in Medium-Term Defense Program



F-35A



Modernize F-15



SH-60K



Type 10 Main Battle Tank



Maneuver combat vehicle



PAC-3MSE



Aegis Destroyer



Submarine



Type 12 surface-to-ship missile

MSE: Missile Segment Enhancement

Space systems

- Formulation of the new **“Basic Plan on Space Policy”** and **its work schedule** (January 2015, with work schedule revised in December 2015)
- ⇒ The “predictability” of industrial investment has been enhanced, and the scale of the domestic space market will expand by a cumulative 5 trillion yen over the next 10 years.
- ⇒ Demand will expand for products and services relating to information gathering/analysis, maritime domain awareness, space situational awareness, etc.



Launches scheduled for FY2016

- H-II Transfer Vehicle **“KOUNOTORI6”** (HTV6)
- Geostationary Meteorological Satellite **“Himawari-9”**, etc.

Basic Policy

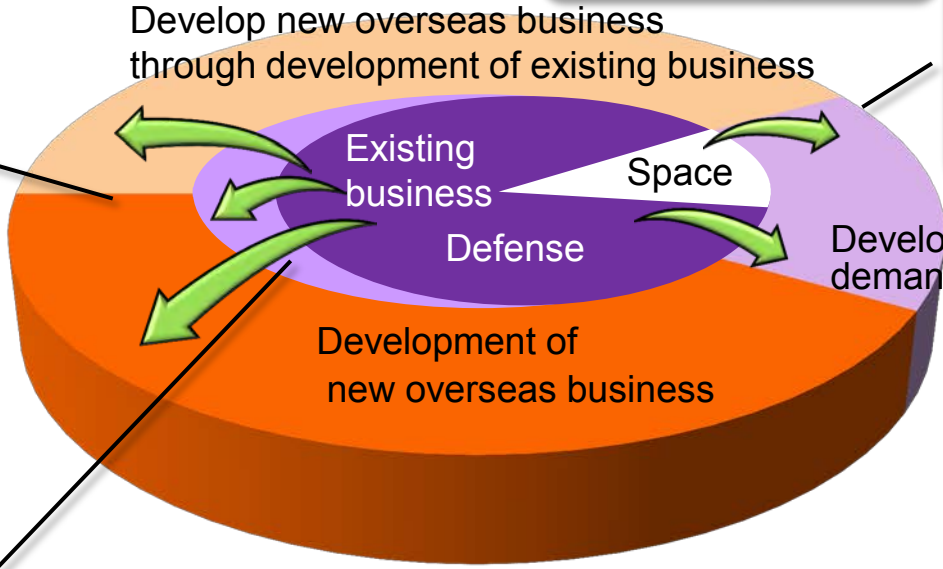
Undertake sustained strengthening of existing business and prepare for next expansion step (initiatives to promote overseas business and conversion to commercial market needs)

Growth Strategy 1

Expand overseas operations leveraging "Three Principles on Transfer of Defense Equipment and Technology"

Growth Strategy 2

Expand private sector demand leveraging state-of-the-art technologies cultivated in Integrated Defense & Space Systems business



Growth Strategy 3

Through land/sea/air/space synergies, expanded orders in domestic defense business

Promoting actions based on 3 growth strategies

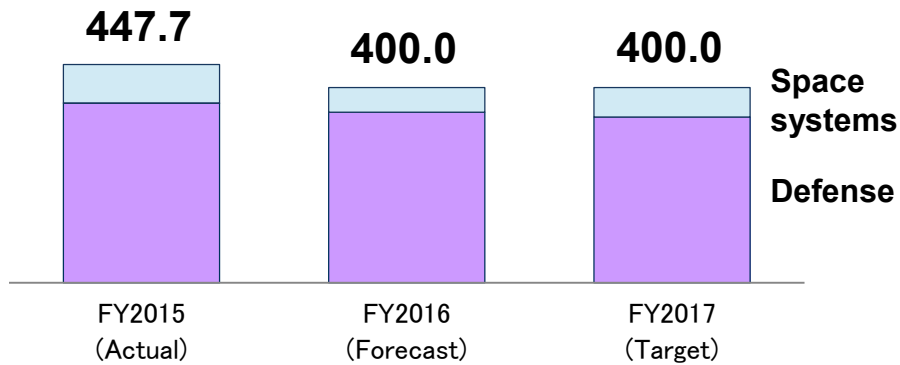
Strategies	Actions
<p>Growth strategy 1: Overseas expansion</p>	<ul style="list-style-type: none"> ➤ Faithful execution of existing contracts (F-35, FACO, SM-3, etc.) ➤ Acceleration of new overseas project proposal activities (promotion of activities in full collaboration with the competent ministries and agencies, in line with the government policy and framework for joint development of equipment, etc.)
<p>Growth strategy 2: Private sector demand expansion</p>	<ul style="list-style-type: none"> ➤ Acceleration of technology development in cyber security, small satellites, etc. ➤ Promoting sales activities for launch services for domestic and overseas commercial satellites
<p>Growth strategy 3: Expansion of existing fields</p>	<ul style="list-style-type: none"> ➤ Accumulation of technological capability for future fighter jets and new naval ships ➤ On-time execution of detailed design for the lower cost of H3 launch vehicle

FACO: Final Assembly and Check Out

2-2. Forecast for FY2016

Orders received

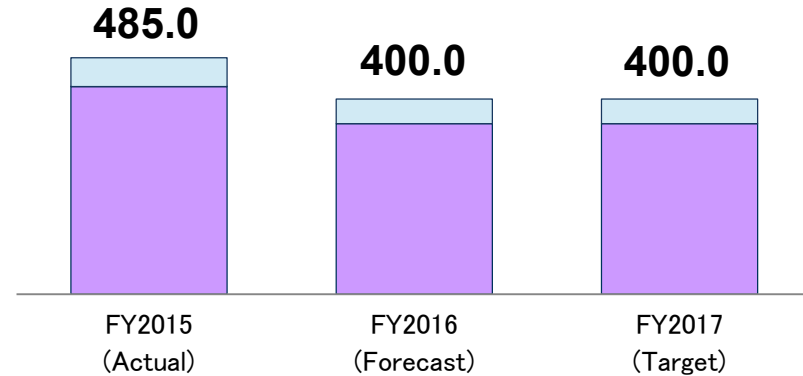
Stable achievement of 400.0 billion yen level



Net sales

(In billion yen)

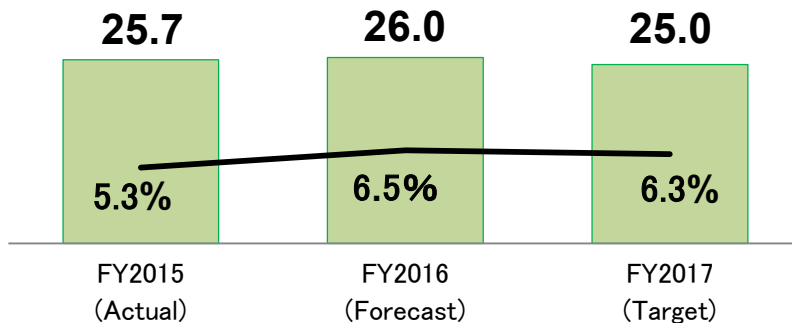
Stable achievement of 400.0 billion yen level



Operating income

Achievement on a par with year-earlier level

■ Operating income
— Operating income ratio



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2. FY2016 Business Policies and Strategies

- 2-1. Business Policies and Strategies
- 2-2. Forecast for FY2016

3. Business Strategies

- 3-1. Defense
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4. Summary

- 4-1. Forecast for FY2016
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3-1-1. Strategy 1: Overseas expansion

Establish foundation for final assembly of F-35, contributing to national security

Defense Fighter

- Build up a track record in final assembly of F-35 fighters, and consider participation in areas that provide back-up support contributing to Japan's national security

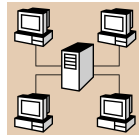
Strategies and initiatives from FY2016 forward

Progress and results achieved in FY2015

- Started production preparation work and commenced assembly work



Plant construction



Installation of equipment and IT systems; training, etc.



F-35 undergoing assembly

reference: <http://www.jsf.mil>

Future initiatives

- Conduct final assembly and functional tests on schedule, and build up a track record in assembly work
- Consider participation in areas providing back-up support



reference: <http://www.jsf.mil>

3-1-2. Strategy 1: Overseas expansion

Promote international collaboration applying technologies and manufacturing infrastructure established through Japan-U.S. Cooperative development.

Defense SM-3 Cooperative Development and Co-Production

- As a pioneering project, acquire expertise in joint international projects
- In accordance with government policy, contribute to national security and cooperation in defense equipment

Strategies and initiatives from FY2016 forward

Progress and results achieved in FY2015

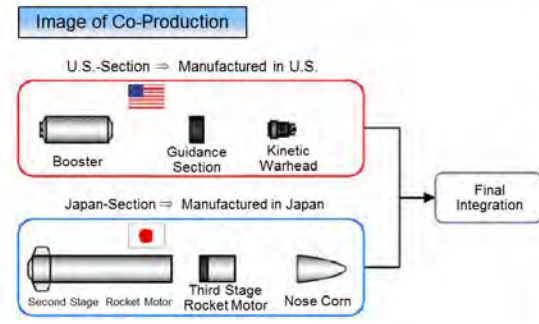
1st Ground based flight test (photos from Ministry of Defense website)



- Supported ground based flight test under government contracts. The expected operations were demonstrated, and development phase shifted to the final stage.
- Along with development, the U.S. government procured SM-3 for Integration Test. Production of section was initiated under direct contract with Raytheon.

Future initiatives

- Support sea-based intercept flight test preparations under government contracts.
- Embark on an effort for production arrangements, in accordance with government policy
- After production decision, produce and export Japan-sections to be deployed in both countries



(images from Ministry of Defense website)

3-1-3. Strategy 1: Overseas expansion (New businesses)

Participate in new international joint development projects, leveraging of technologies and experience

Defense

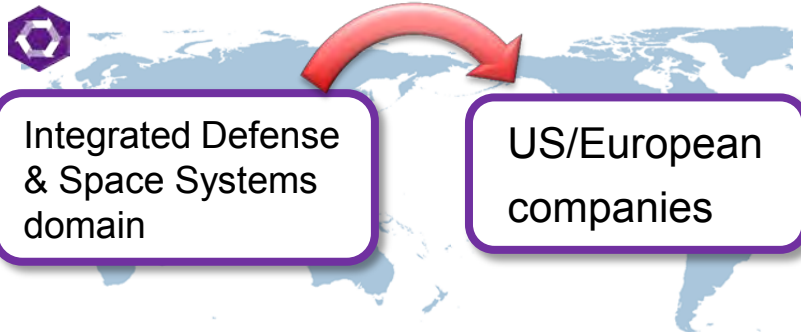
New overseas business

- Utilize cutting-edge technologies cultivated in domestic defense and space business
- Make use of channels cultivated in international joint projects and licensed projects

Strategies and initiatives from FY2016 forward

Progress and results achieved in FY2015

- Began discussions with various companies to collaborate in cutting-edge technology fields



Future initiatives

- Improve level of technological strength through in-house R&D
- Focus on projects that will contribute to international peace and cooperation
- Promote participation in joint research and joint development projects



3-1-4. Strategy 2: Private sector demand expansion

Promote private-sector projects, leveraging of cutting-edge technologies cultivated through defense and space development

Defense Cyber Security

- Develop security-related products and services to protect critical infrastructure facilities from cyber terror threats

Strategies and initiatives from FY2016 forward

Progress and results achieved in FY2015

- Established the “Cyber Lab” as a new technology development and verification base



Future initiatives

- Promote development, jointly with NTT, of technologies for critical infrastructure control systems



- 1) Detect and respond in real time to difficult-to-detect unknown attacks
- 2) Carry out responsive measures without halting operation of critical infrastructure

3-1-5. Strategy 3: Expansion of existing fields

Expand business based on the track record in developing fighter jets and the advanced technology demonstrator jet

Defense

**Next generation
Fighters**

- In April 2016 MHI successfully completed the first test flight of the advanced technology demonstrator jet.
- Based on these results and other research results, we will participate in projects to develop and mass-produce a successors to the F-2 fighter, etc.

Strategies and initiatives from FY2016 forward

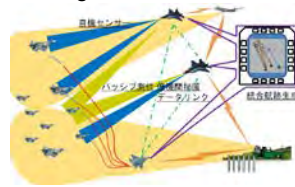
Progress and results achieved in FY2015

- Carried forward the accumulation and advancement of elemental technologies relating to jet fighters

Stealth fighter jet design technology



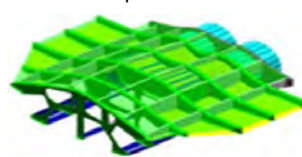
Network-Integrated combat technology



Advanced integrated sensor technology



Advanced composite material structure



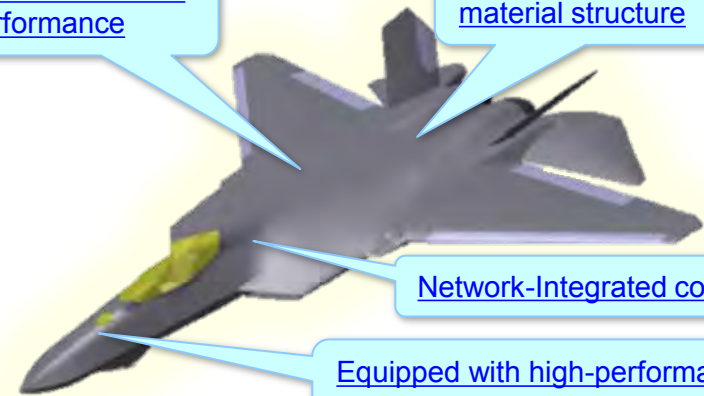
Source: Ministry of Internal Affairs and Communications website
(Prior policy evaluation of Research and Development conducted by MOD)

Future initiatives

- Carry forward advanced system integration

Advanced stealth performance

Lightweight composite-material structure



Network-Integrated combat

Equipped with high-performance integrated sensors

Source: Defense Technology Symposium 2014

3-1-6. Strategy 3: Expansion of existing fields

Expand business opportunities by integrating cutting-edge technologies cultivated through land, sea and air defense equipment

Defense
New naval ship

- Develop solutions for a new concept ship
- As a system integrator, help improve new naval ships' capabilities

Strategies and initiatives from FY2016 forward

Progress and results achieved in FY2015

- Elemental technology development was researched in-house and implemented by public-sector.

Cyber security technology

Stealth technology



In-house research



Investigative research under consignment from Ministry of Defense

Future initiatives

- Step up system integration for ships incorporating the domain's technologies

New naval ship system integration



3-2-1. Strategy 2: Private sector demand expansion

Promote private sector demand-based business applying cutting-edge technologies cultivated through development of defense and space products

Space systems

Small satellites

- **Acquire technology relevant to small satellites**
- **Provide added value through processing of big data, etc.**

Strategies and initiatives from FY2016 forward

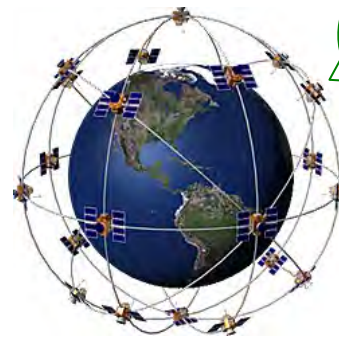
Progress and results achieved in FY2015

- **Launched in-house manufactured small satellite in 50kg class; currently in operational testing (ChubuSat-3)**
- **Participated in project to develop small high-performance satellites for the future**



Future initiatives

- **In considering potential business in small satellites, strengthen links with all quarters to integrate diverse technologies, including processing of big data**



3-2-2. Strategy 2: Private sector demand expansion

Expand business by integrating areas of excellence in all businesses

Space systems

Launch services (commercial satellite)

- Expand private sector business and orders from overseas based on strengths in quality and high reliability, plus strengthening of response capability to market needs and cost competitiveness

Strategies and initiatives from FY2016 forward

Progress and results achieved in FY2015

- Completed development of a more advanced H- II A launch vehicle, and successfully launched Telesat's Telstar 12 VANTAGE satellite in November 2015
- In March 2016, received an order from UAE (The Mohammed bin Rashid Space Centre) to launch a Mars mission spacecraft
- Received overseas orders (commercial and governmental) for the third consecutive year since FY2013

Future initiatives

- Continue marketing H- II A launch services to countries new to space exploration
- Accelerate activities to attract orders for H- II A and H3 launch services from leading global satellite operators



3-2-3. Strategy 3: Expansion of existing fields

Expand business by strengthening global competitiveness in satellite launch services

Space systems

H3 development

- Carry out duty to secure autonomous national launch capacity with a flagship launch vehicle, and strengthen global competitiveness through cost reductions to expand launch vehicle services in the global market

Strategies and initiatives from FY2016 forward

Progress and results achieved in FY2015

- Carried out basic design work and established base-line specifications

- Length: approx. 63m
- Core Rocket core diameter: approx. 5.2m
- Solid fuel rocket booster diameter: approx. 2.5m
- Customer services
 - Payload environmental conditions: Above global standards
 - Lead time from order receipt to launch: Above global standards

《Concepts behind H3 launch vehicle development》

- Competitive capabilities and cost
- Response to desired launch timing
- Realization of a payload-friendly rocket capsule



Future initiatives

- Evaluation of the basic system design was conducted in April, and approval to proceed to the next phase “detailed design”
- Detailed design of rocket system and development and testing of sub-system components will be carried out in view of a first launch in FY2020
- Marketing activities for the H3’s launch services will be conducted with commercial satellite customers

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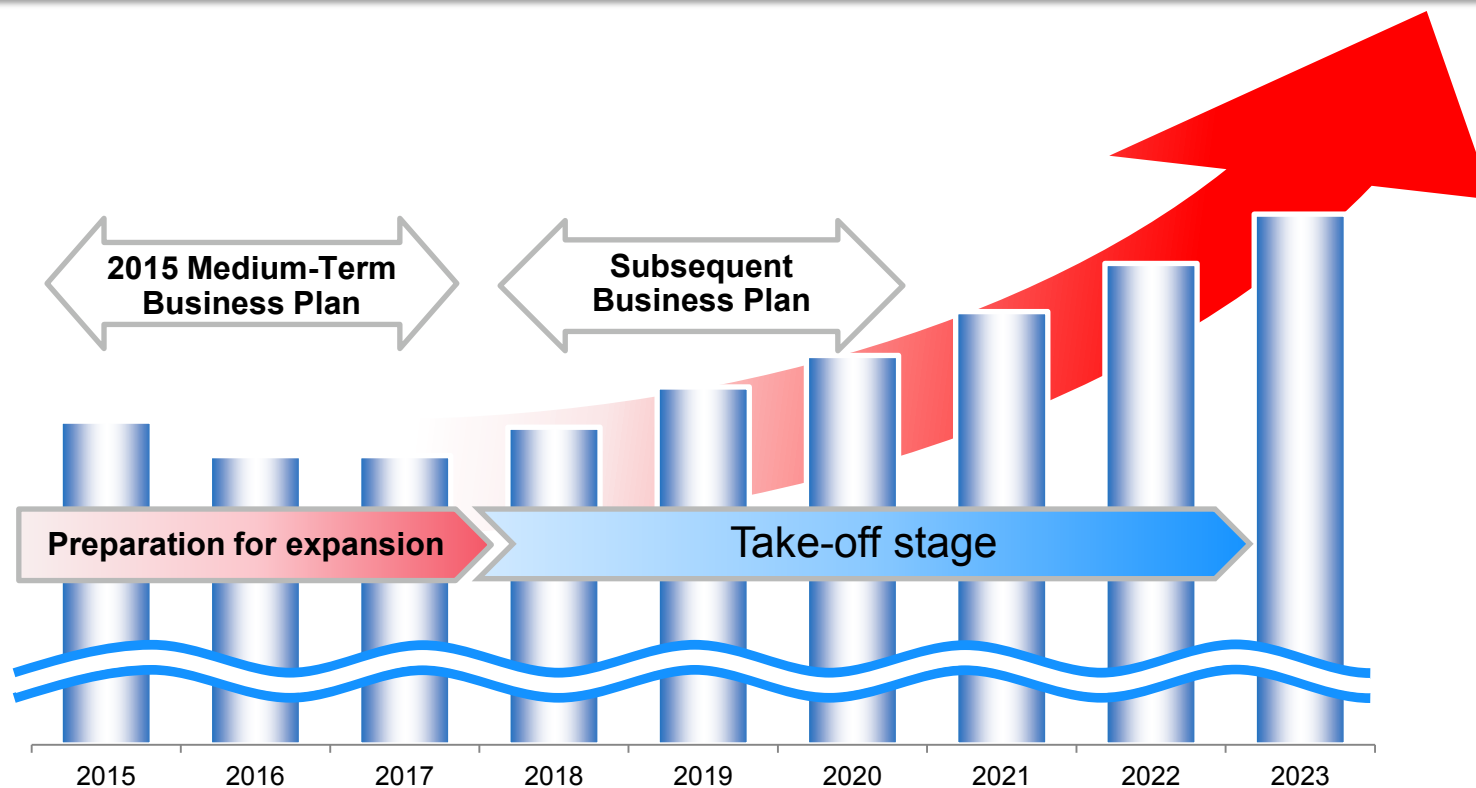
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(In billion yen)

	FY2016 (Forecast)	FY2017 (Target)
Orders received	400.0	400.0
Net sales	400.0	400.0
Operating Income	26.0	25.0
Operating Income ratio	6.5%	6.3%

- Sustain strengthening of existing businesses
 - Carry forward operational and managerial streamlining, and manifest the domain's synergies
- Prepare for expansion
 - Commercialize new overseas projects and step up initiatives toward commencing joint international development
 - Accelerate private sector demand expansion through dual use cutting-edge technologies

Break through existing frameworks and expand business scale



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