Aircraft, Defense & Space Business Plan

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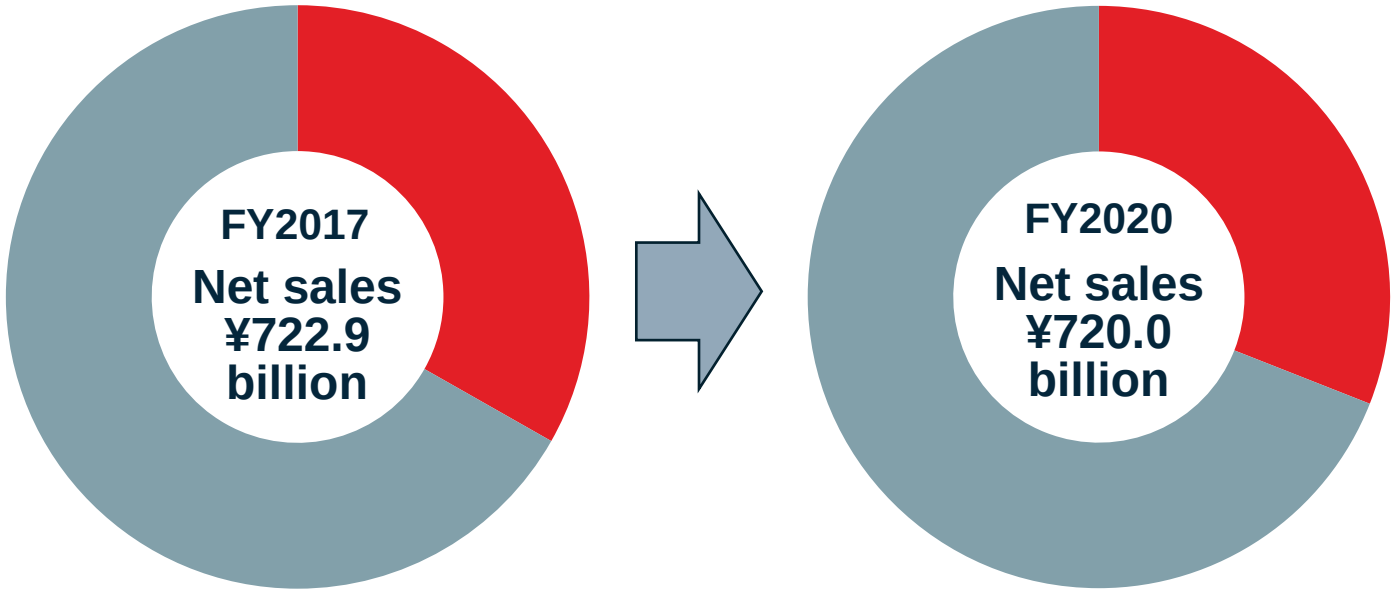
Contents

1. Business Overview (FY2017 Results and 2018 Business Plan)

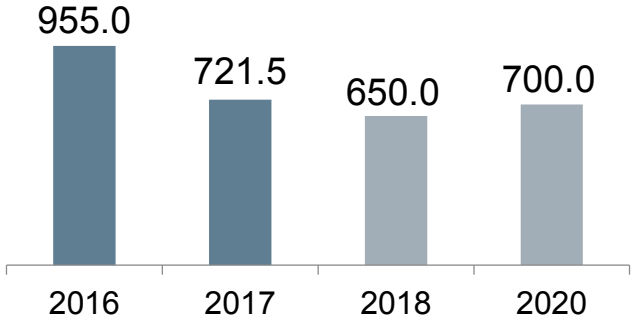
Integrated Defense & Space Systems
- Naval ships
- Aircraft & missile systems
- Special vehicles
- Space systems

Commercial Aviation Systems
- Aircraft components for Boeing
- Aircraft components for Airbus, Bombardier, etc.
- MRJ

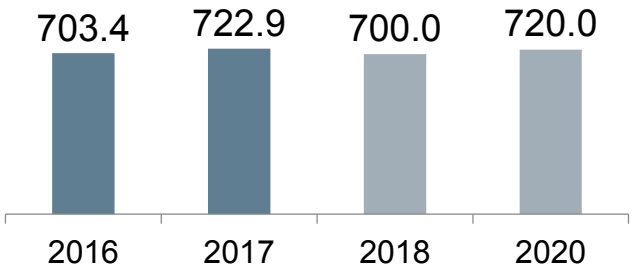


(in billion yen)

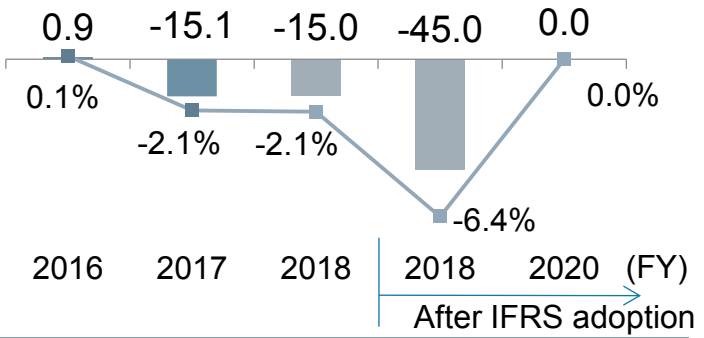
Orders Received



Net Sales



Operating Income / EBIT

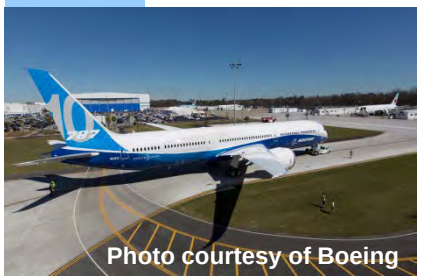


MHI FUTURE STREAM In step with social evolution

2-1. Overview

Boeing

787

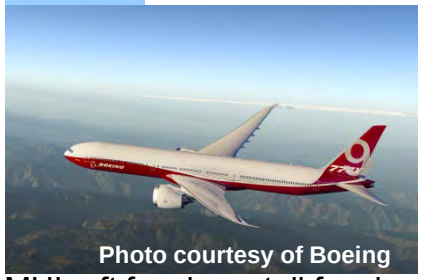


MHI: main wing boxes

777

MHI: aft fuselage, tail fuselage and entry doors

777X



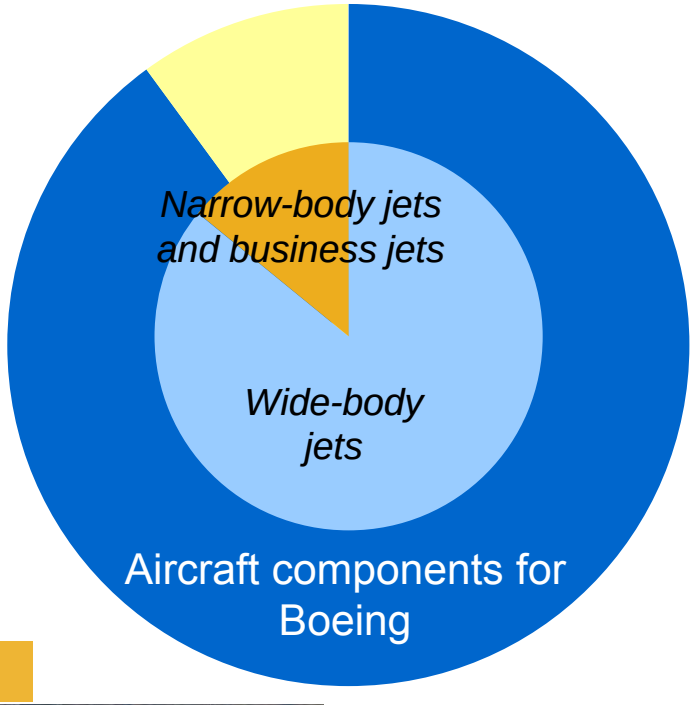
MHI: aft fuselage, tail fuselage and entry doors

737

MHI: inboard flaps

Wide-body jets

Aircraft components for Airbus, Bombardier, etc.



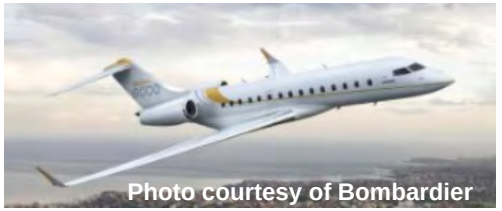
Airbus

A380

MHI: fwd and aft cargo doors

Bombardier

Global 5000/6000



MHI: main wings, center-fuselage and center wing

Challenger 300/350

MHI: main wings

Narrow-body jets and business jets

2-2. Review of 2015 Medium-Term Business Plan

Summary

◇ Establish structures to boost production rate

- Automated production line for 777X fuselages
- Preparation for 12/14 shipsets mo. production of 787 wing-boxes
- Restructuring of SCM and reform of procurement processes for commercial aircraft
  (Establishment of “Commercial Aircraft Procurement Center” and the Matsusaka cluster)
- Introduction of new production planning/management system (ERP(Enterprise Resource Management) system)

Automated 777X assembly line

787 main wing assembly line

◇ Delay in adapting to changing business environment

- Launched “Business Structure Reform” activities from FY2017 (reductions in flow time and fixed costs, etc.), which resulted in upward trend profitability.

Business Circumstances

(1) Market expansion over next 20 years(operating fleets to be doubled)
- Temporary production decrease through 2018 Business Plan period due to transition period from Boeing 777 to 777X

(2) Necessity to reduce contract prices due to fierce OEM sales price competition

(3) Intensified competition with overseas manufacturers
- Increased performance of Machine Tools
- Development in IoT technologies
- Active M&A transactions and acceleration of alliances and market realignment

Future Initiatives

◆Strengthen cost competitiveness to withstand severe business environment

◆Ensure differentiated competitive advantages to overwhelm the competitors

◆Enhance Value-added proposals to the customers

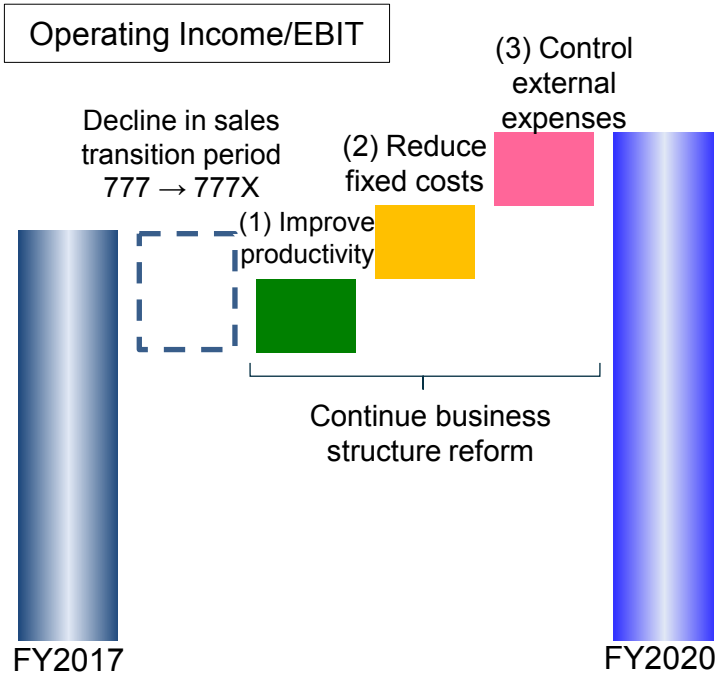
Continue
“Business Structure Reform”

2-3. Policies and Strategies
2018 Medium-Term Business Plan (1/3)

Continue Business Structure Reform

1. **Maintain Income by improving productivity and reducing fixed costs, etc.**

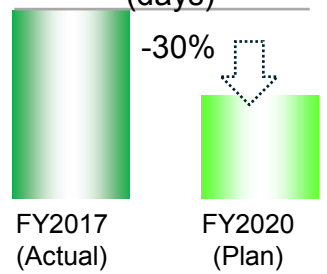
2. **Pursue differentiation with competitors**



(1) Improve productivity

- Accelerate manpower savings by introducing automated equipment
- Automate indirect work process using AI/IoT
- Concentrate production capacities to achieve high efficient parts manufacturing (Integrated production lines/Matsusaka cluster)

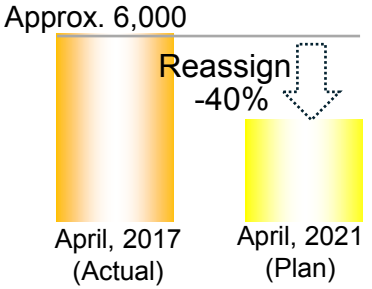
Shorten production lead time (days)



(2) Reduce fixed costs

- Replace auxiliary/routine man-work by IT systems
  → Reduce labour costs
- Upgrade personal abilities and skills(*), optimized reallocation of human resource through multi-skilling educations

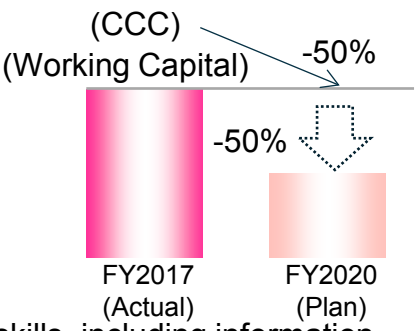
HR Restructuring (headcount)



(3) Control external expenses

- Reduce working capital and generate cash flow by advanced procurement processes(*)
- Bring outsourced work process in-house through utilization of upskilled human resources

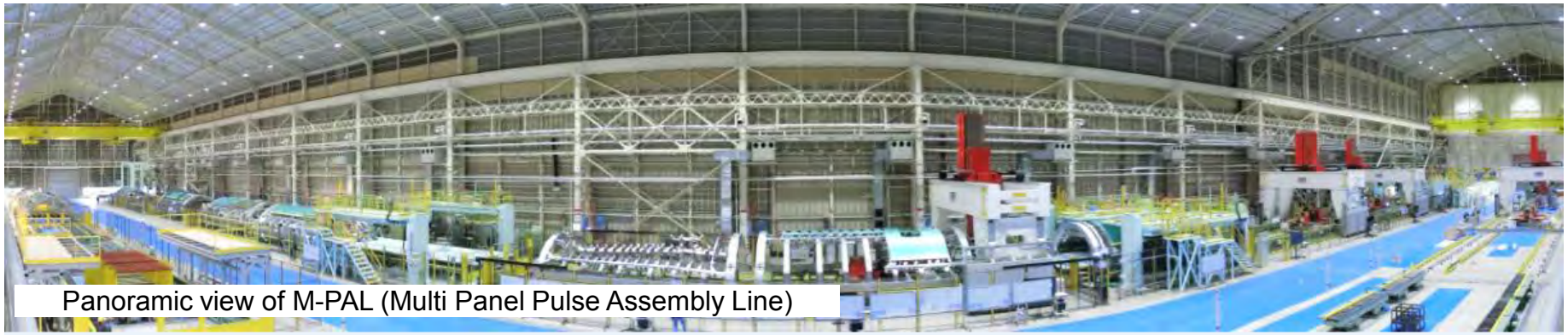
Working Capital / CCC



(*) Introduce systems for acquisition of specialist skills, including information systems such as AI/IoT/RPA, production processes, procurement operations, CAD/NC programs, etc.

2-3. Policies and Strategies
2018 Medium-Term Business Plan (2/3)

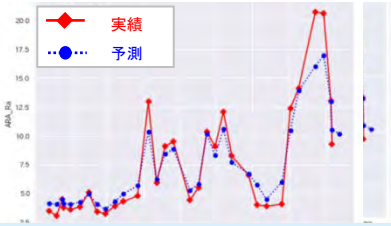
◆ World Class Assembly Production Line for 777X and 787



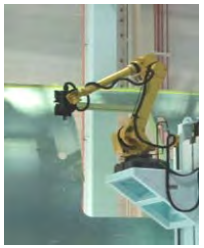
Panoramic view of M-PAL (Multi Panel Pulse Assembly Line)

Skin positioning assembly → Panel assembly → Frame assembly → Inspection

Real time monitoring of production line



Equipment check /preventive maintenance



Apply AI/IoT to inspection work

Expand scope of automation (manpower saving →unmanned operation)

2-3. Policies and Strategies
2018 Medium-Term Business Plan (3/3)

Increase MRJ's commercial value

Synergy with other MHI business area

Defence/Space

New business areas

- **Future aircraft**
- **Traffic control**

etc.

MEGA SCAN

Expansion to differentiated competitive advantage areas

- **Advanced materials (Composites)**
- **Advanced engineering /manufacturing processes (Additive Manufacturing)**
- **High value-added products (Key-components, etc.)**

SHIFT THE PATH

Production technology

- Improve productivity for commercial production

Leading edge technology

Continue "Business Structure Reform" and strengthen existing businesses

Promote automation (manpower saving→ full automation)

Upskill and cross-train human resources

2018 Business Plan → 2021 Business Plan → Medium-to-long term plan

3-1. Development Status

FY2017 Achievements

- Established development organization with global aviation industry experts assigned to key positions
- Enhanced development structure with cross-functional organizations
- Type certification acquisition from Federal Aviation Administration (FAA) for Pratt & Whitney (P&W) PW1200G engine
- MRJ exhibited at Paris Air Show
- Started part fabrications for the modification of flight test aircraft
- Achieved over 1,800 flight hours

Natural icing test

FY2018 Solutions

Development

- Accelerate type certification (TC) flight tests
- Proceed the assembly of additional flight test aircrafts

Farnborough Air Show

- Following Paris Air Show last year, plan to exhibit the MRJ and conduct flight demonstration

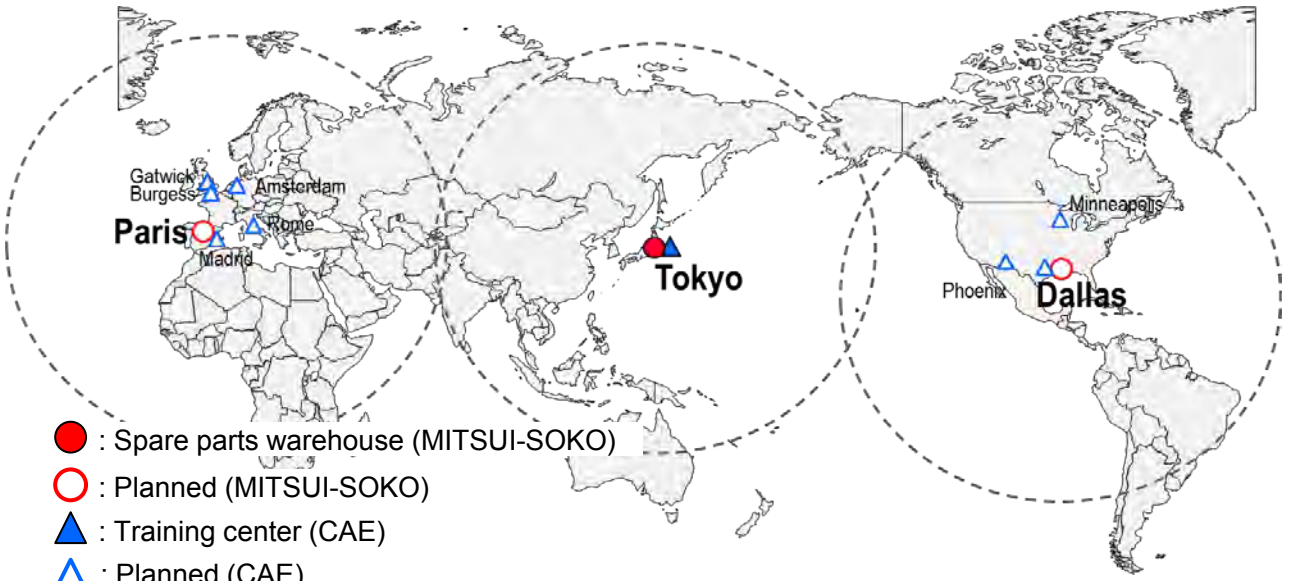
3-2. Preparations for MRJ Production (1/2)

Preparations for MRJ Production/Customer Support (CS)

Establish CS Business Operation Bases in Japan and the U.S., then expand operations to other regions

- ◆ Establish three bases for global spare-parts logistics and support networks, with the U.S. and Europe to be our second and third hubs
- ◆ Expand global training centers in accordance with customer base expansion

Global Bases for Spare-Parts and Training



- : Spare parts warehouse (MITSUI-SOKO)
- : Planned (MITSUI-SOKO)
- : Training center (CAE)
- : Planned (CAE)
  - • Lists locations only where there is a possibility of utilization
  - • There are multiple sites other than those listed

Status of Initiatives

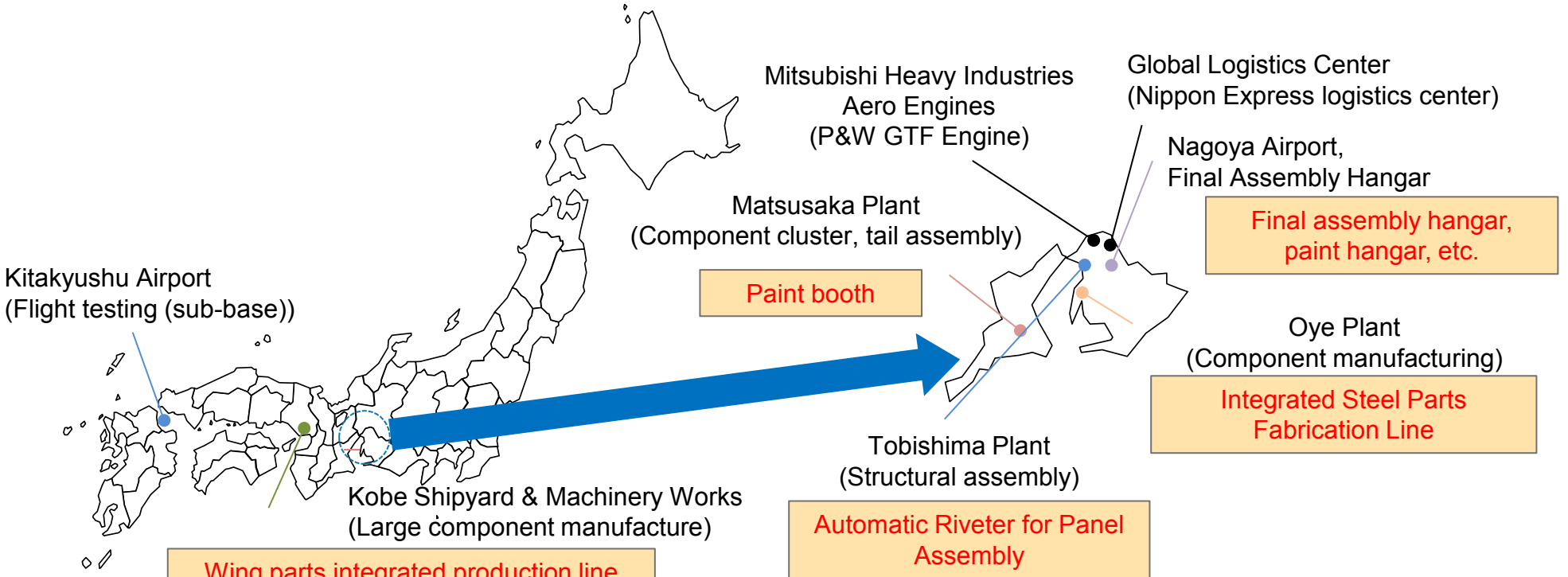
- Completed development of enterprise resources planning (ERP) system and commenced operational testing
- Developed MRJ web portal with Boeing's support
- Selected Mitsui-Soko as Logistics Partner to utilize their infrastructure in US/Europe
- Selected HAECO Americas, Pemco World Air Services (PEMCO), and MRO Japan as the preferred MRO service providers in North America and Asia
- Crew Training by CAE with using their training network

MRO: Maintenance, Repair and Overhaul

3-2. Preparation for MRJ Production (2/2)

Preparation for MRJ Production / Production Organization

- Consider additional capital expenditure in line with orders as well as market and customer trends to meet demand with eye on maximum 10 aircraft per month production rate
- Planning to introduce automated structural assembly and state-of-the-art IT tools and IoT for production processes to achieve cost reduction and prompt production rate up



P&W: Pratt and Whitney
GTF: Geared Turbo Fan

3-3. Efforts aimed at MRJ Commercialization (1/3)

Value of MRJ Program

- Global air traffic has raised by 5% every year, and preference in the market for low cost and high frequency air operation is stimulating demand for single-aisle aircraft like the 737/320. The upgrade and expansion of the single-aisle network also brings an increase in demand for smaller category aircraft operations covered by Regional Jet (RJ).

- Secure a future business profit base by establishing the position as airframe OEM in the commercial aviation industries, which is expected to grow over the medium-to-long term.

- Aimed at expanding business opportunities into high value-added sectors, such as systems and components, by utilizing experience in the airframe OEM business and technical capabilities in the Tier 1 business.

- Increase the global brand strength of MHI Group by making an image leader out of the aviation business, with a spotlight on its leading edge technology.

- Establish a business foundation of total aircraft integration in Japan, creating the foundation for the development of Japanese aerospace industry, including equipment.

3-3. Efforts aimed at MRJ Commercialization (2/3)

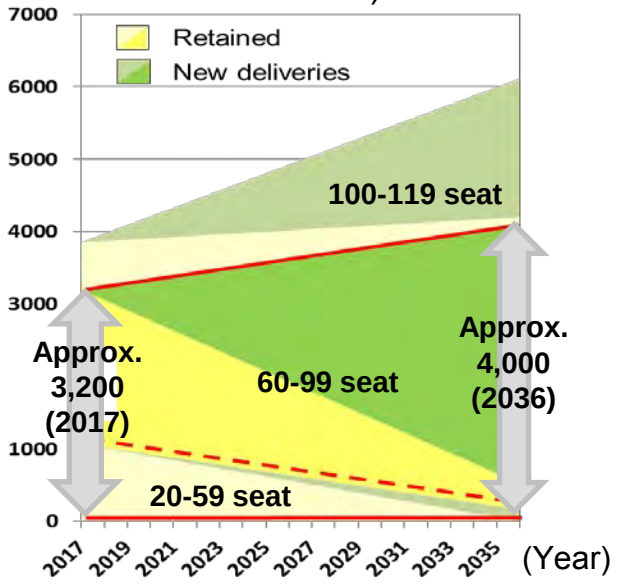
Market Outlook

RJ market overall

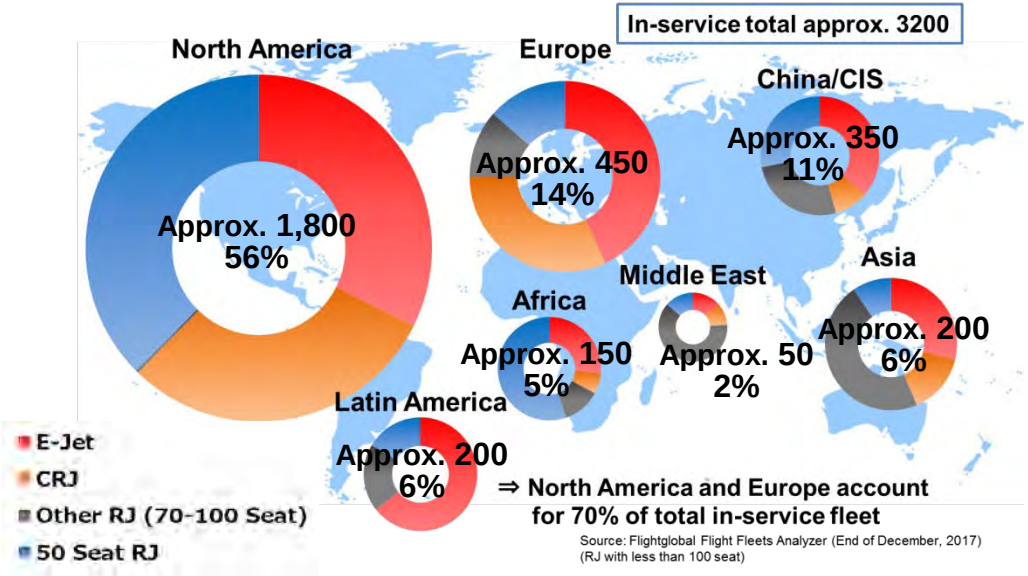
- The 60-99 seat-class aircraft market, which is the target market for the MRJ, also includes replacement demand for “out-of-product” RJ (59 seats-or-less), and demand is expected to be around 3,500 aircraft over the next 20 years.
- There are currently approximately 3,200 RJs in service worldwide, and many of them are likely to generate future replacement demand, with North America and Europe accounting for 70% of that demand.

North America	◆ World’s largest RJ market, approx. 1,800 aircraft in service at end of 2017. ◆ Due to the Scope Clause, it is currently difficult for the MRJ90 to operate at major US airlines. However, the MRJ70 can operate under the current Scope Clause.
Europe	◆ Trend for demand at major airlines to shift toward 100+ seat- class. Meanwhile, suitable routes for RJs exist, and a given level of demand is expected to continue.
Asia	◆ Currently majority of small size aircraft is by Turboprop, but growth is expected due to development of airport infrastructure and maturing of operations.

RJ (less than 100 seat-class) demand forecast



Number of RJs in service (As of the end of 2017)



3-3. Efforts aimed at MRJ Commercialization (3/3)

Business Opportunities in Commercial Aviation Industry

◆ Identify business opportunities across the entire aircraft sales life cycle for future revenue growth

Life cycle

Players and service content		
Player	**Roles**	**Details**
Airframe OEM	Aircraft sales	Aircraft sales to Operators
	Spare part sales	Spare part sales to Operators
Component Supplier	Manufacture and sale	Component sales to Airframe OEMs
	Spare part sales	Spare part sales to Operators
Lease & Finance	Secure slots	Secure aircraft in anticipation of vacant slots at airlines
	Financing	Providing leasing aircraft with using Lessor's better finance position
	Residual value risk	Offset Residual risk from Operator to Lessor (by leasing aircraft)
	Create used aircraft market	Used aircraft sales
MRO	MRO	Maintenance and repair services for aircraft and components

MRJ/Airframe OEM business

Opportunity for high value-added Market

Cooperate with outside partners

OEM: Original Equipment Manufacturer

MRO: Maintenance, Repair and Overhaul

3-4. MRJ Business Restructuring to Assure Long-Term Business Continuity

Steady Progresses at MRJ90 Development

- ◆MRJ90 Development and TC acquisition
- ◆Delivery of first aircraft to ANA in mid-2020

Approach to assure Long-Term Business Continuity

Strengthen ties with Tier 1 businesses	→	Expand profitability through business synergy and entry into high value-added markets
Strengthen sales and customer support structures	→	Enhance human resources and consider partnerships with outside agencies
Pursue full-scale development and early TC acquisition of MRJ70	→	Secure business base in the commercial aviation industry by quickly establishing a firm presence in the largest RJ markets

4-1. Overview

Defense

F-2 Fighter

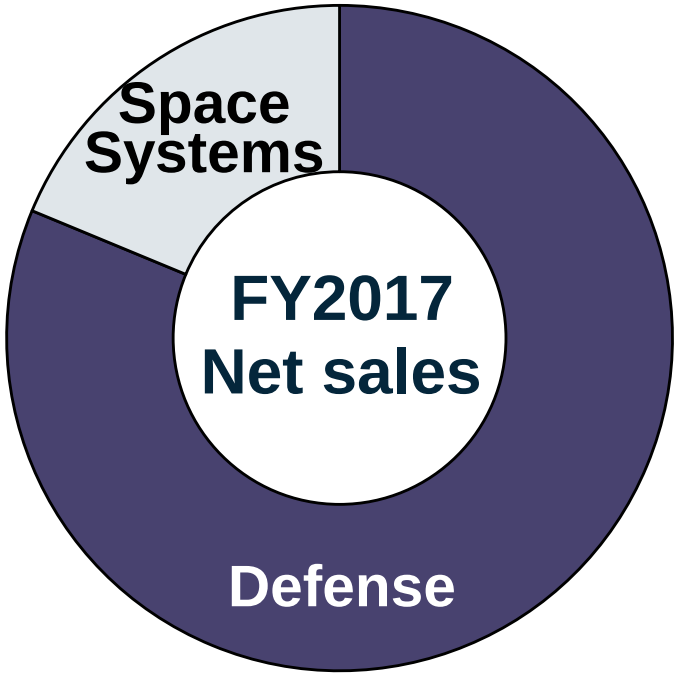
SH-60K Maritime Patrol Helicopter

PAC-3

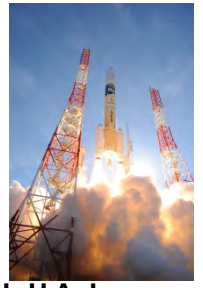
SM-3

“Seiryu” Submarine

“Asahi” Destroyer



Space Systems



H-IIA Launch Vehicle

H-IIB Launch Vehicle

H-II Transfer Vehicle (HTV)

Source:
Japan Ground Self-Defense Force website

Type 16 Mobile Combat Vehicle

Type 10 Main Battle Tank

4-1. Overview (FY2017 Major Projects and Orders Received)

Defense

- **F-35**

2017 Jun	Unveiling ceremony for first plane assembled in Japan
Nov	First Aircraft Delivery
2018 Jan	Second Aircraft Delivery

- **New type of destroyers**

2017 Aug **Selected as primary contractor**

- **Delivery ceremonies**

2018 Mar	Asahi-class destroyer “Asahi”	Nagasaki
	Soryu-class submarine “Seiryu”	Kobe

- **Type 16 Mobile Combat Vehicle**

2017 Aug	Start of delivery
Oct	Production vehicle delivery ceremony at Sagamihara

Space Systems

- **Launch vehicles**

1) Launch of H-IIA/B

2017 Jun	H-IIA	No. 34
Aug		No. 35
Oct		No. 36
Dec		No. 37
2018 Feb		No. 38

2) Order received for launch services

2017 Sep **Received order for H-IIA Launch Services from U.K. Inmarsat, launch scheduled for 2020**

3) H3

2017 Apr Started LE-9 engine hot firing tests at Tanegashima

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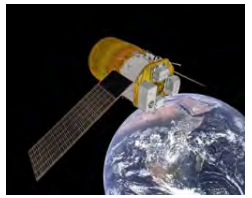
- **HTV**

1) HTV-X in preliminary design



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4-2. Review of 2015 Medium-Term Business Plan

Achievements and Status of 2015 Business Plan

- Continuous strengthening of existing businesses
  - Main indicators such as sales and operating income achieved 2015 Business Plan figures
- Preparing for next expansionary step
  - Implementing growth strategy activities to expand business

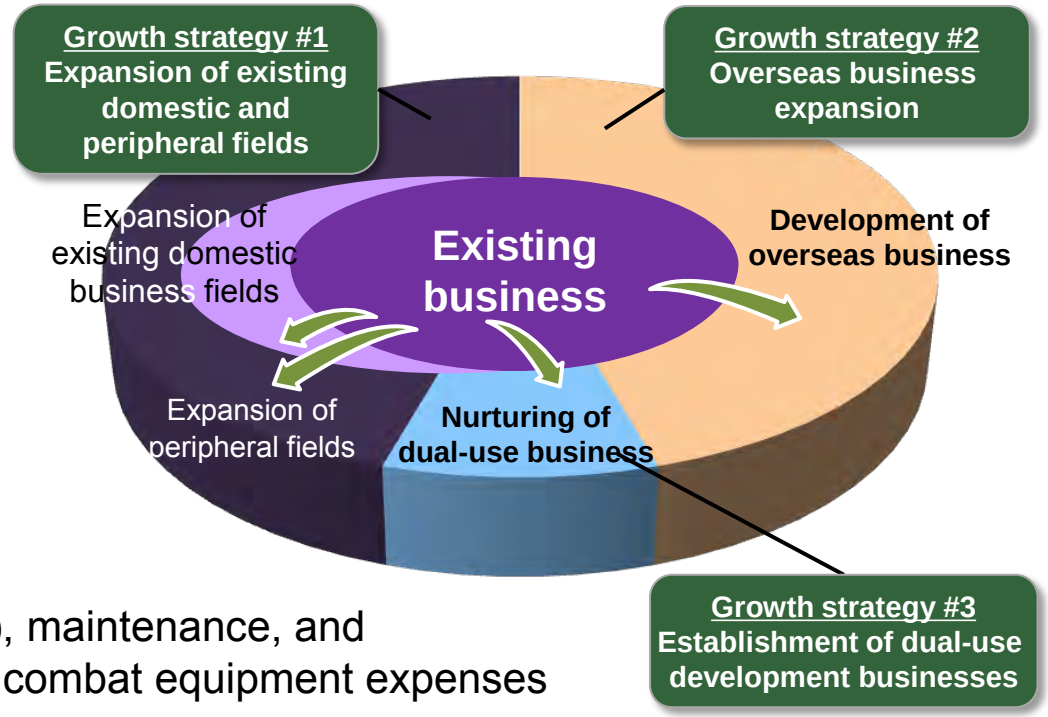
New Challenges

- Strengthening structure
  - Continued squeezing of fixed costs to contribute to company-wide improvement in operating margins
- Accelerate and strengthen growth strategy
  - Steadily get next core businesses up and running
  - Accelerate 2015 Business Plan growth strategies

4-3. Policies and Strategies of 2018 Medium-Term Business Plan (1/6)

Basic Policies

- Expand business through acceleration of growth strategies
- Continuously strengthen existing businesses



Market Trends

Government/domestic

- Foreign military sales (imported components), maintenance, and servicing expenses to increase and front line combat equipment expenses to decrease
- Increased use of outer space in national security field

U.S./global

- Review of U.S. strategy due to increasing technical capabilities of threat countries
  ⇒ Pursuit of superiority in unmanned vehicle and links network
  Importance of ensuring superiority in cyberspace
- Mounting tension in peripheral region
  ⇒ Necessity for equipment to respond to counter threats
  Importance of interoperability with alliance

4-3. Policies and Strategies of 2018 Medium-Term Business Plan (2/6)

Strategy

Growth strategy #1: Expansion of existing domestic and peripheral fields

(1) Existing business
- Steadily get next core businesses up and running
- Expansion of business territory (command and control, M&S, etc.)

(2) Peripheral fields
- Expand MRO business in maintenance and servicing fields
- Expand into new peripheral fields (unmanned vehicles, utilization of big data, etc.)

M&S: Modeling and simulation MRO: Maintenance, Repair and Overhaul

Growth strategy #2: Overseas business expansion

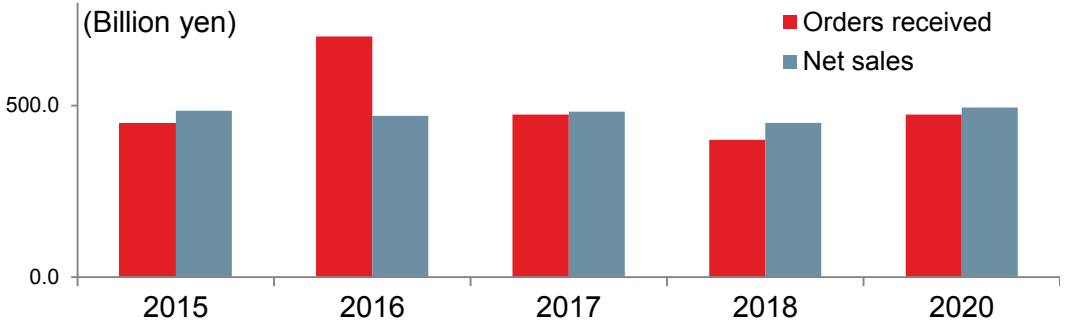
(1) Adapting MHI components for use in overseas equipment
- Utilize channels with overseas manufacturers cultivated through existing businesses
- Lobby Japanese government in parallel with inter-company consultations

(2) Potential international joint development projects
- Enter joint development projects with alliance countries
- Promote start-up in collaboration with Japanese government

Growth strategy #3: Establishment of dual-use development businesses

- Utilize core technologies of defense business
- Meet private sector demand particularly in security field

Targets



4-3. Policies and Strategies of 2018 Medium-Term Business Plan (3/6)

Growth Strategy #1 Expansion of existing domestic and peripheral fields

Existing

Defense

BMD

FY2017 achievements

MSE missile
- Initial product preparation in (full) progress.
- Continuing production contracts

SM-3Block ⅡA
- Commencement of missile delivery for U.S. government

MSE missile

Source: Lockheed Martin website

MSE: Missile Segment Enhancement
BMD: Ballistic Missile Defense

Future solutions

- Stable MSE missile manufacturing and delivery
- Business proposal to integrate Aegis Ashore and MSE, etc. to enhance BMD capabilities

Aegis Ashore

Space Systems

Launch Services

FY2017 achievements

- Launched five H-IIA rockets
- Started hot firing tests of 1st and 2nd stage engines of H3 Launch Vehicle
- Received order for H-IIA Launch Services from a global satellite operator, Inmarsat

Future solutions

- Continue successful launches
- Steadily accomplish H3 development
- Increase presence in the commercial/ overseas market

Peripheral

MRO business

- Entry into government maintenance work under private sector
  - Integrated management of armed forces and in-house maintenance data, contributing to streamlining of maintenance
- Expand into MRO business for U.S. forces stationed in Japan
  - Field that can utilize equipment models common to Japan and U.S. and owned facilities

Satellite Data Utilization

- Analyze satellite images and other data for maritime domain awareness and disaster response (Japan and surrounding seas).

MRO: Maintenance, Repair and Overhaul

4-3. Policies and Strategies of 2018 Medium-Term Business Plan (4/6)

Growth Strategy #2 Overseas business expansion

F-35 fighter — Defense

FY2017 achievements

- Maiden flight of the first aircraft assembled at MHI
- The first and second aircraft delivery

Source: http://www.jsf.mil/

Ferry flight to Misawa Air Base

Future solutions

- Continuous On-Schedule delivery
- Stand-up MRO&U capability

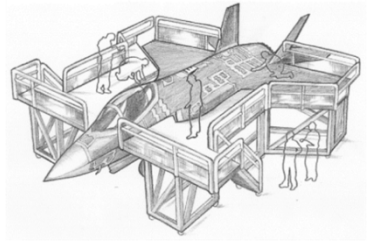


Image of MRO&U

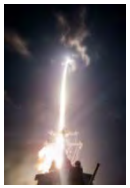
MRO&U: Maintenance, Repair, Overhaul, and Upgrade

Joint development and production of SM-3 — Defense

FY2017 achievements

- Japanese Cabinet has approved procurement plan for SM-3 production (FMS procurement from U.S. government)
- Commenced delivery of SM-3 for U.S. integration test

(MHI → Raytheon → delivered to U.S. government)



Flight test mission: Feb 3 2017 (U.S. time)
(Source: Acquisition, Technology & Logistics Agency website)

FMS: Foreign Military Sales

Future solutions

- Commence smooth commercial production under joint Japan-U.S. production system

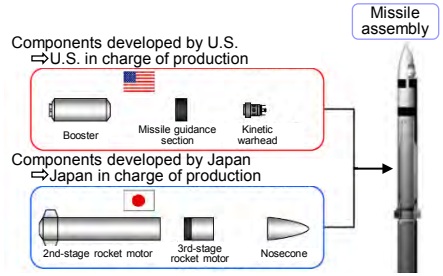


Image of joint production system
(Source: MHI, based on Acquisition, Technology & Logistics Agency website)

Make use of key technologies and channels cultivated in defense and space systems business

New Business

- ✓ Initiatives underway together with Government, toward potential international joint development projects
- ✓ Discussions underway among international companies toward adapting MHI key components for use in overseas equipment

4-3. Policies and Strategies of 2018 Medium-Term Business Plan (5/6)

Growth Strategy #3 Establishment of dual-use development businesses

Leverage core technologies cultivated in the defense and space area to develop new business in the advanced security, automation, and autonomy fields.

Advanced security

Cybersecurity

InteRSePT®

FY2017 achievements

- Completed InteRSePT® product commercialization
- Applied to defense products

- Started business development for overseas consumer applications

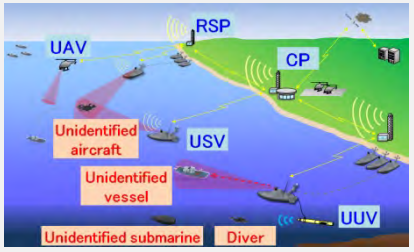
Future solutions

- Enhance capabilities and expand functions
- Expand product applications and build up track record

- Strengthen sales capabilities through alliances

Automation and autonomy

Coast guard system using unmanned vehicles



CoasTitan®

FY2017 achievements

- Demonstration using prototype
- Market survey in Japan and overseas

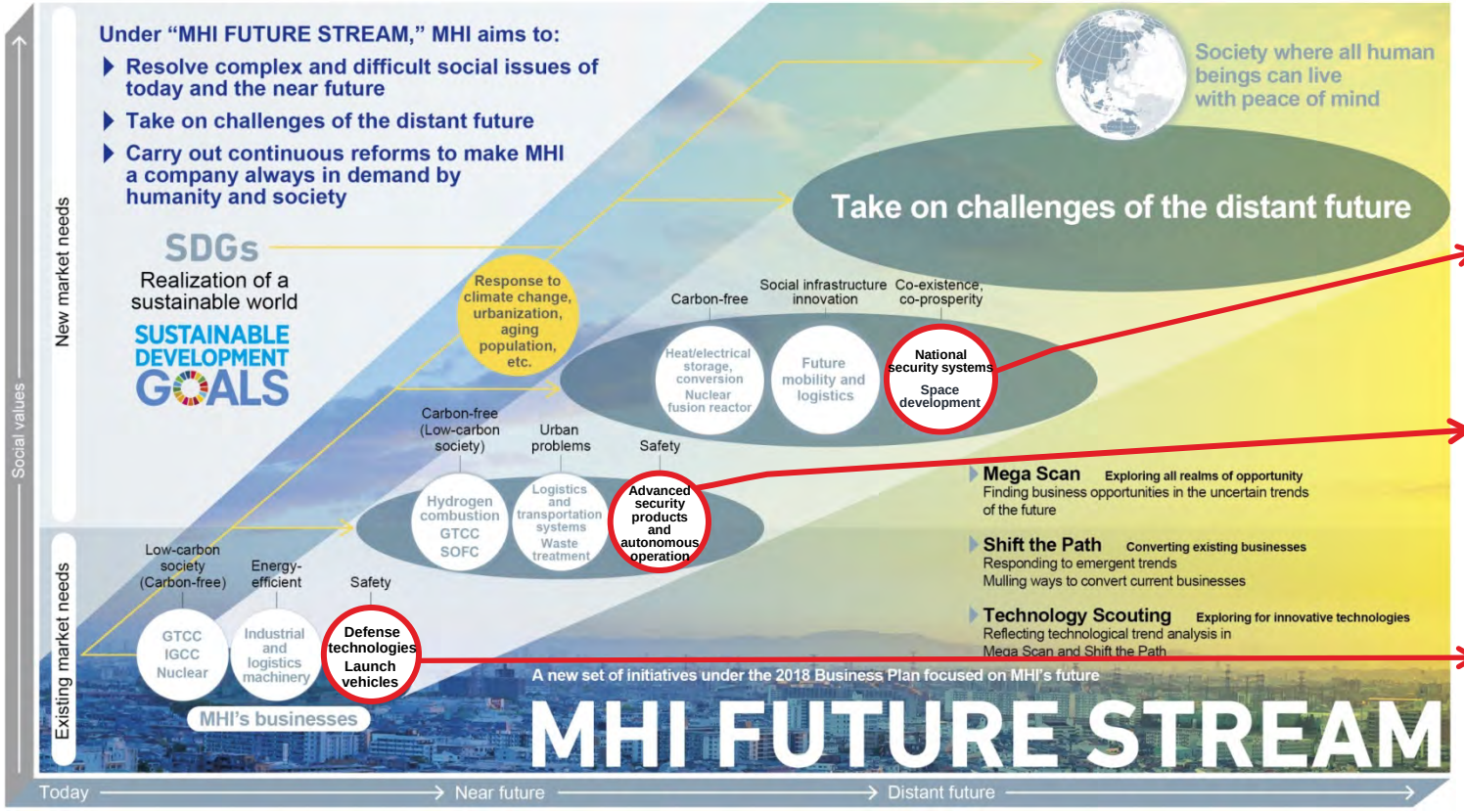
Future solutions

- Add components and enhance level of autonomy
- Product commercialization through joint development with partners

4-3. Policies and Strategies of 2018 Medium-Term Business Plan (6/6)

2018 Medium-Term Business Plan – Long-term vision

Expand business territory from land, sea, air and space to cyberspace and provide total solutions enabling safety and security



Land, sea, air + space + cyberspace
Safe and secure total solutions

Land, sea, air + space + cyberspace
Dual-use business Peripheral field business

Land, sea, air	Space
Front line combat equipment	Launch Vehicle

MOVE THE WORLD FORWARD

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INDUSTRIES
GROUP