Business Briefing on Aerospace Systems

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Relationship Between Aerospace Systems and Business Domains

Business domain	Customers/ Markets	Segment					
		Shipbuilding & Ocean Development	Power Systems	Machinery & Steel Infrastructure Systems	Aerospace Systems	General Machinery & Special Vehicles	Others (Air-Conditioning/ Machine Tool)
Energy & Environment	• Power companies • Gas companies • Resource companies (oil, chemicals, steel)		• GTCC • Large-scale thermal power plants • Nuclear power plants	• Environmental plants • Chemical plants			
Machinery, Equipment Systems	• Core industries (steel, etc.) • Automotive industry • Logistics, etc.		• Stationary engines	• Compressors • Metals machinery • Crane & material handling systems		• Turbo-chargers • Forklift trucks • Engines	• Air-conditioning equipment • Machine tools
Transportation	• Airlines (air) • Shipping companies (sea) • Railways (land), etc.	• Commercial Ships		• Transportation system	• Commercial aircraft		
Defense & Aerospace	• Ministry of Defense (land, sea and air) • JAXA, etc.	• Destroyers & submarines			• Defense aircraft • Missiles • Space Systems	• Special vehicles	

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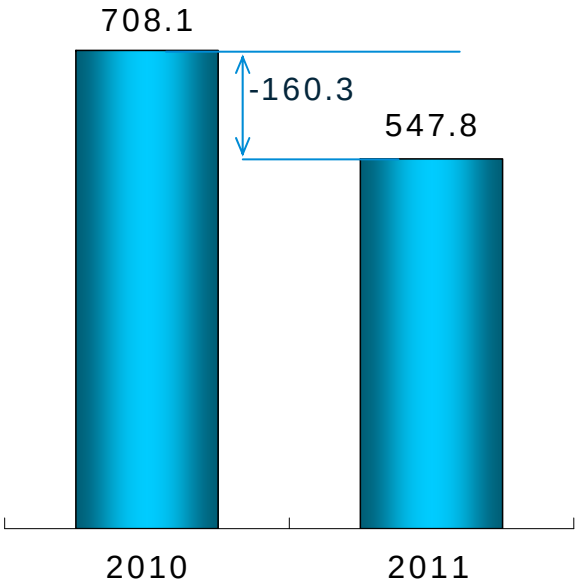
(Billion yen)

Orders received

- Decreased from the previous fiscal year with the decrease of defense-related orders. The decrease is also attributable to the large-scale order for commercial aircraft received in the previous fiscal year.

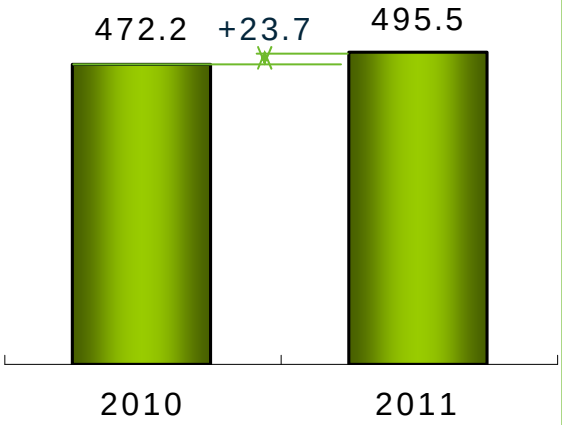


Net sales

- Exceeded the previous year because of an increase in all three businesses of defense, commercial aircraft, and space
- Aircraft deliveries

  B777: 83 airplanes (+20 planes YOY)

  B787: 27 airplanes (+10 planes YOY)



Operating profit

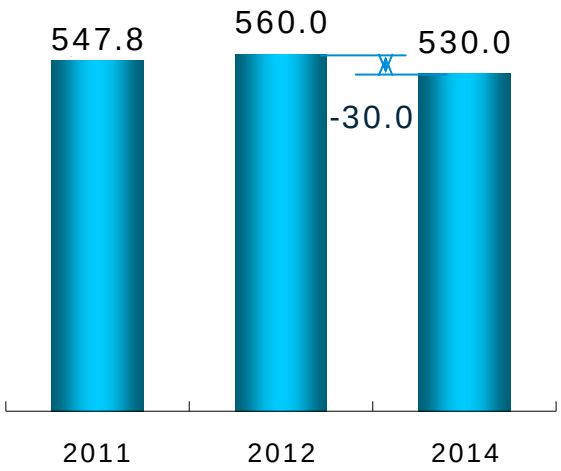
- The deficit increased from the previous year mainly due to the strong yen.

2. Target of the 2012 Plan

(Billion yen)

Orders received

- The overall orders will remain almost flat, with gradual decreases in defense / space related orders offset by an increase of orders for commercial aircraft.

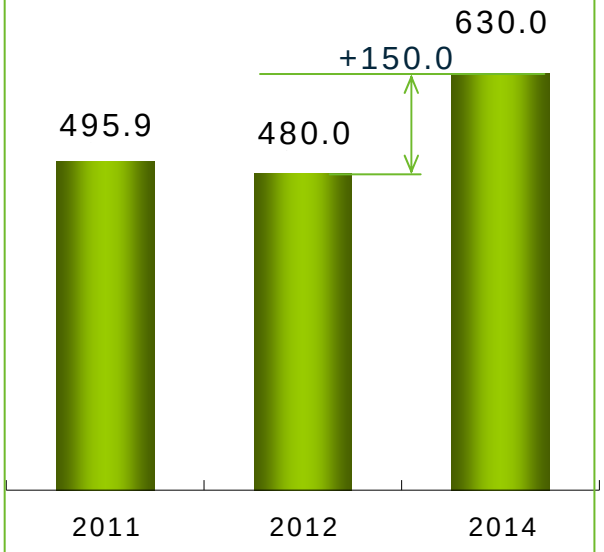


Net sales

- Increase to the 600 billion yen level with the growth in sales in the commercial aircraft and space business
- Aircraft deliveries for FY 2014

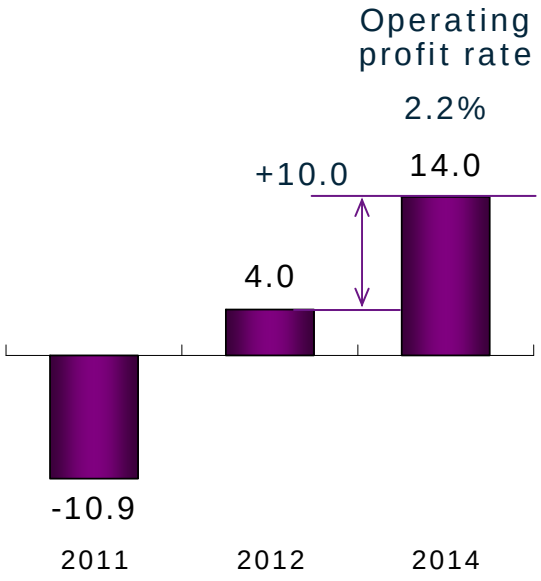
  B777: 100 airplanes (+17 planes compared to FY 2011)

  B787: 120 airplanes (+93 planes compared to FY 2011)



Operating profit

- A return to profitability in 2012 due in part to an improvement in the profitability of commercial aircraft.



Commercial Aircraft

- Complete MRJ development successfully and establish a full production system.
- Develop global SCM.
- Improve profitability through manufacturing innovations.

Defense

- Propose integrated defense systems by coordinating businesses for land, sea and air.

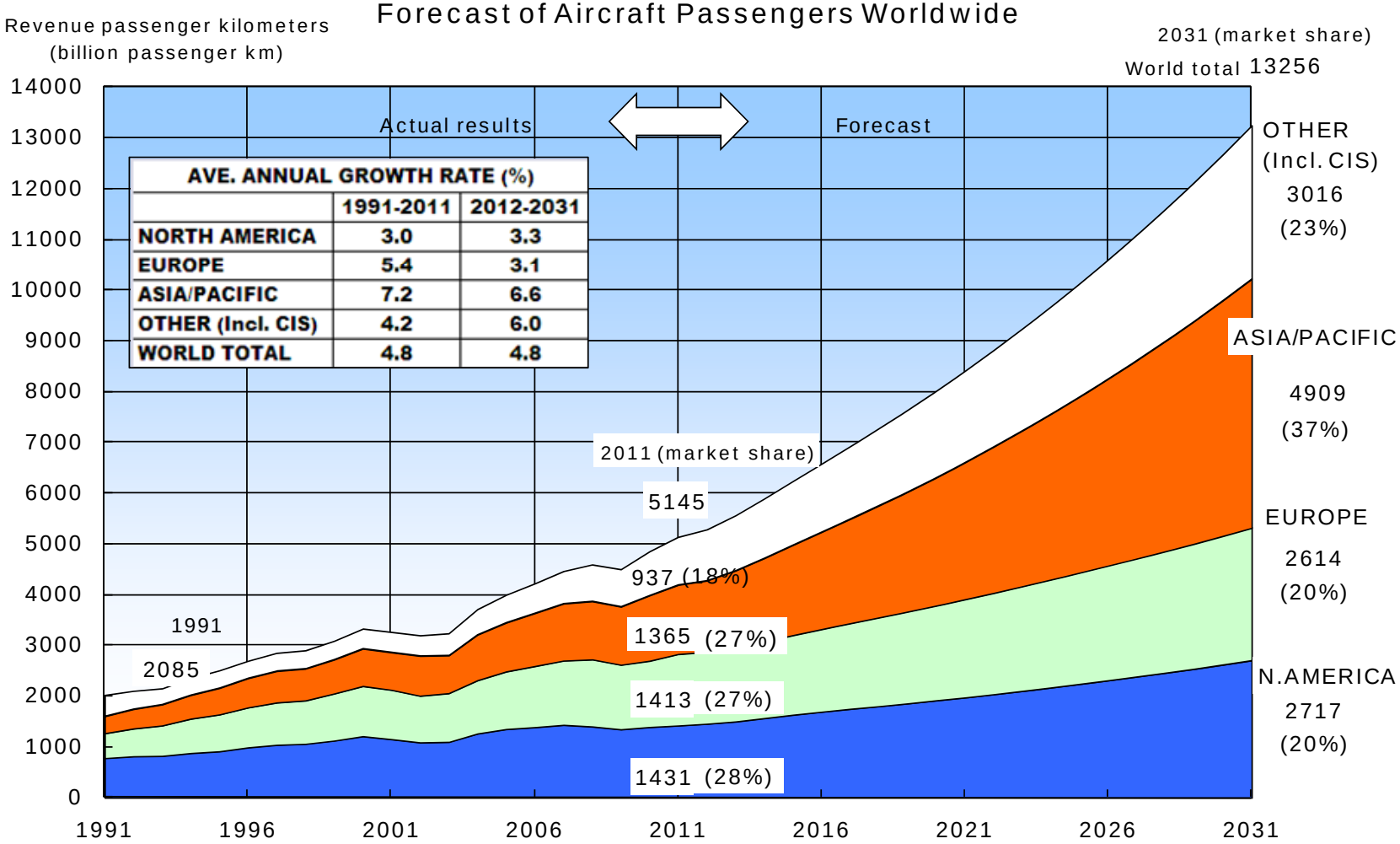
Space

Continuous successes in the launch of H-II A/B

- Enhance competitiveness through development of next-generation primary launch vehicle etc.

Demand for aircraft is right on track for upturn by airline's recovery and continued growth of economies in emerging countries.
High growth is expected in the long term (by 2.5 times in 20 years).

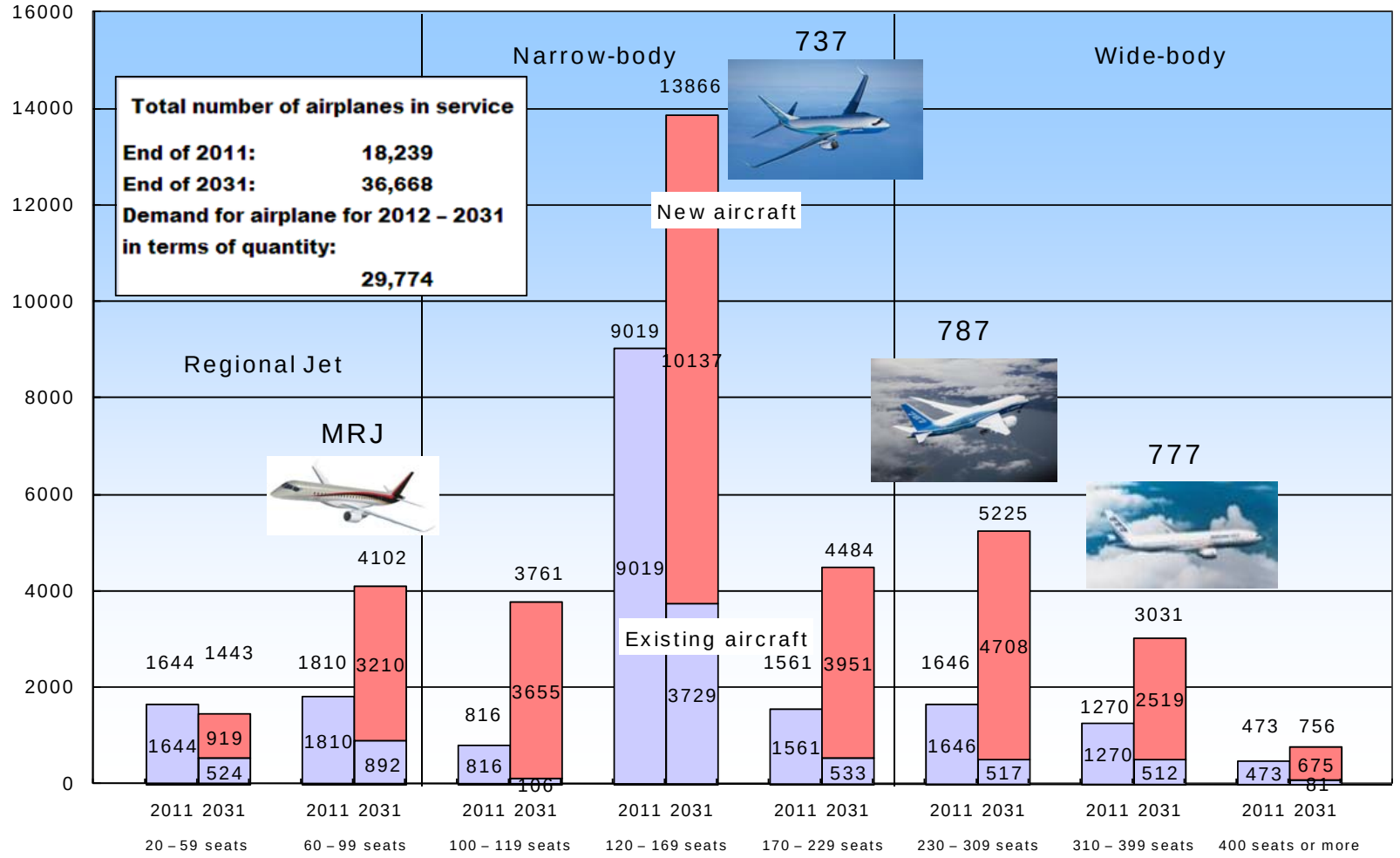
Forecast of Aircraft Passengers Worldwide



Source: Japan Aircraft Development Corporation

Demand for approx. 30,000 new airplanes in 20 years (2012 - 2031)

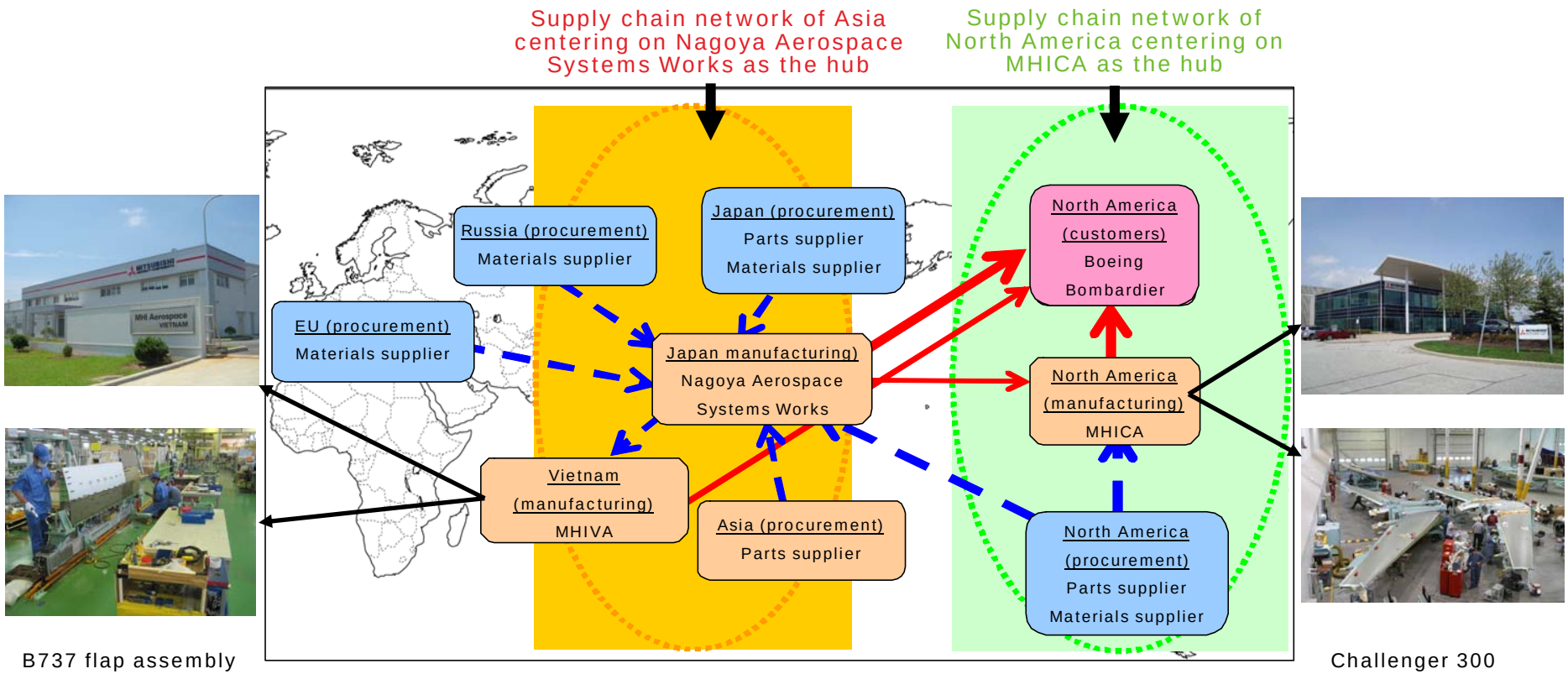
Forecast on the number of jet airplanes in service and demand for them by size



Source: Japan Aircraft Development Corporation

Develop global SCM.

- Establish supply chains with two hubs.
- Increase overseas production and overseas procurement (shift to overseas cost base)



B737 flap assembly line in Vietnam (MHIVA)

Challenger 300 assembly line in Canada (MHICA)

Improve profitability through drastic manufacturing innovations.

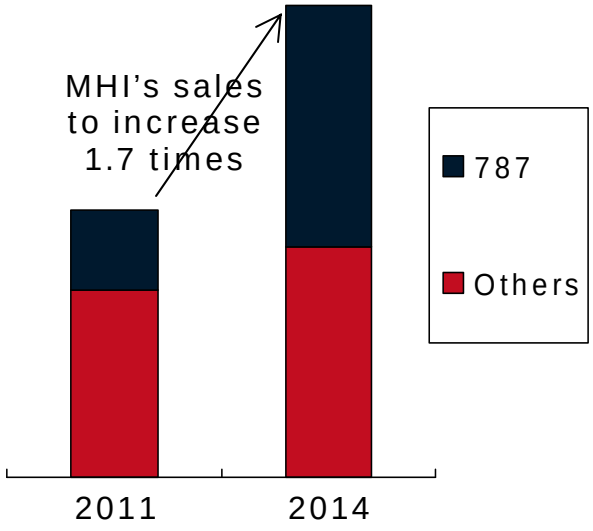
- Assembly work upgrade
  - Automation of B787 production (Coordination with MHI's Machine Tool division)
  - Development of "moving line" for B777 assembly

Automatic riveter for 787

- Parts procurement innovations

1) Enhance production management function
   - Develop an integrated line for each parts group
   - Construction/renewal of surface treatment and painting facilities
   - Just-in-time supply of parts to assembly line

2) Enhance competitiveness of domestic partners
   - Reorganize SCM flow by enhancing coordination among partners
   - Purchasing parts at low prices by giving bulk orders to partners



1) Status

✓ : Actual results

- In September 2011, Boeing delivered the first airplane to ANA.
- Increase sales and profit by expanding core facilities such as autoclave and investments for production efficiency towards the increase of the production rate up to 10 aircraft per month.

B787 (From ANA website)

✓ Dec. 2009: Successful first flight
✓ Mar. 2011: Firm orders for more than 830 airplanes
✓ Apr. 2011: MHI wings for 40 airplanes delivered
✓ Aug. 2011: Type Certification
✓ Sept. 2011: Delivery of first airplane
End 2013: 10 airplanes per month delivery

B787 (From JAL website)

2) Improve production efficiency and introduce automation (to support production rate of 10 airplanes per month)

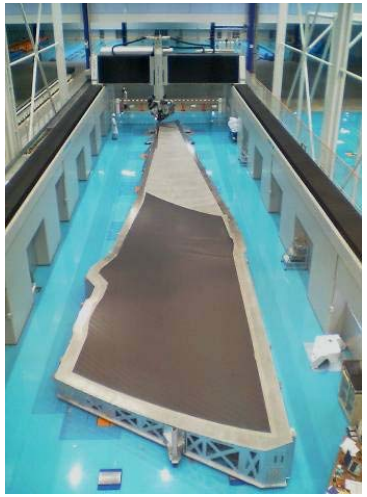
- Expand facilities and introduce automated equipment to support production rate increase

One of the world's largest autoclaves (Expanded)

Water-jet cutting machine for skin (Expanded)

Automatic laminator for stringers (Expanded)

Stringer end trimmer (Introduced)



Composite material layup equipment (Expanded)

1) MRJ's competitive edge: Economical fuel consumption

MRJ		Competing aircraft
	<Example> Haneda – Hakodate: Haneda – Hiroshima: Flight distance: Approx. 800 km (420 nm)	
2,180 liters	Fuel consumption per flight	2,950 liters
<Economic efficiency comparison>		
4,770 kiloliters (1,260 kilogallons)	Annual consumption (6 flights/day x 365 days)	6,460 kiloliters (1,700 kilogallons)
¥320 million	Fuel cost* ($3.2/gallon x ¥80/$)	¥440 million
¥90 million	Aviation fuel tax (¥18,000/kiloliter)	¥120 million
¥410 million		¥560 million

Approx. ¥150 million saving per year

*Average unit price for 2011

2) Status

✓ : Actual results

- ✓ Oct. 2007: Authorization to Offer (ATO)
- ✓ Mar 2008: Launch (Concluded LOI with ANA for 25 airplanes (including 10 options))
  → Jun. 2010: Definitive purchase agreement
- ✓ Apr. 2008: Started business as Mitsubishi Aircraft Corporation
- ✓ Oct 2008: Established a sales office in the United States
- ✓ Sept. 2009: Finalized the MRJ configuration (expansion of cabin space, integration of cargo space, main wing materials change)
- ✓ Oct. 2009: Announcement of the signing of LOI with Trans States Holdings, Inc. for 100 airplanes (including 50 options)
  → Dec. 2010: Definitive purchase agreement
- ✓ Sept. 2010: From detailed designing phase to the production phase
- ✓ Apr. 2011: Start assembly work
- ✓ Jun. 2011: Conclusion of an agreement with Boeing for MRJ customer support
  Conclusion of an LOI with Hong Kong-based ANI Group Holdings Ltd. concerning purchase of five airplanes

Q3 of FY2013: First flight
FY 2015: Type Certification
Mid - 2nd Half of FY2015: First aircraft delivery

3) Topics

- June 22, 2011: Mitsubishi Aircraft Corporation announced its partnership with Boeing at the Paris Air Show

  (Details of the partnership)
  - Spare parts provisioning
  - Service operations and field services
  - Provision of 24/7 customer support

President Egawa of Mitsubishi Aircraft Corporation (left) and Jim Albaugh, president and CEO of Boeing Commercial Airplanes

- On April 30, 2012, Pratt & Whitney commenced flight tests for its PurePower® PW1200G engine for MRJ in Canada.

Pratt & Whitney
A United Technologies Company

4) Schedule change

First flight	1st quarter of FY2012	3rd quarter of FY2013
First aircraft delivery	4th quarter of FY2013	Middle to 2nd half of FY2015

- **Reason for the schedule change**
  Confirm respective fabrication processes and Provide sufficient time for technical studies.

- **Actions**
  - Accelerate development and manufacturing quality verification processes
    - Apply expertise from successful deployment of Taiwan bullet train project
    - Flight test in U.S.
  - Mass production preparation

Reinforcement of the defense industrial base is needed, given growing tension in the security environment.

1) Increase of security threats such as ballistic missiles

- Aegis destroyer (SM-3) and PAC-3 missiles were deployed against the ballistic missile firing in April. MHI also provided technical support.
- Missile development is promoted by China, India, South Korea, etc.

2) Fighter aircraft

- F-35A was selected as the next-generation fighter aircraft. MHI was selected as Potential Domestic Contractor to Participate in Manufacturing and After-servicing of F-35A.
- Neighboring countries is developing 5th-generation fighter aircraft. Japan is also developing the Advanced Technology Demonstrator-X to prepare for development of future indigenous fighter aircraft.

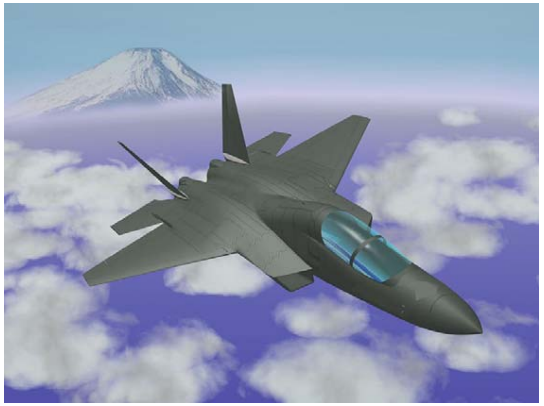
3) Relaxation of Three Principles on Arms Exports

- Overseas transfer of defense equipment etc. for cases related to peace contribution and international cooperation and international joint development and production of defense equipment etc. with countries in cooperating relationship with Japan was comprehensively exempted from Three Principles on Arms Exports.

4) Measures for maintaining, developing, and upgrading defense production and technological base

- Strategies for maintaining defense industrial base are being developed by the Study Group on Defense Production and Technological Bases of Ministry of Defence.

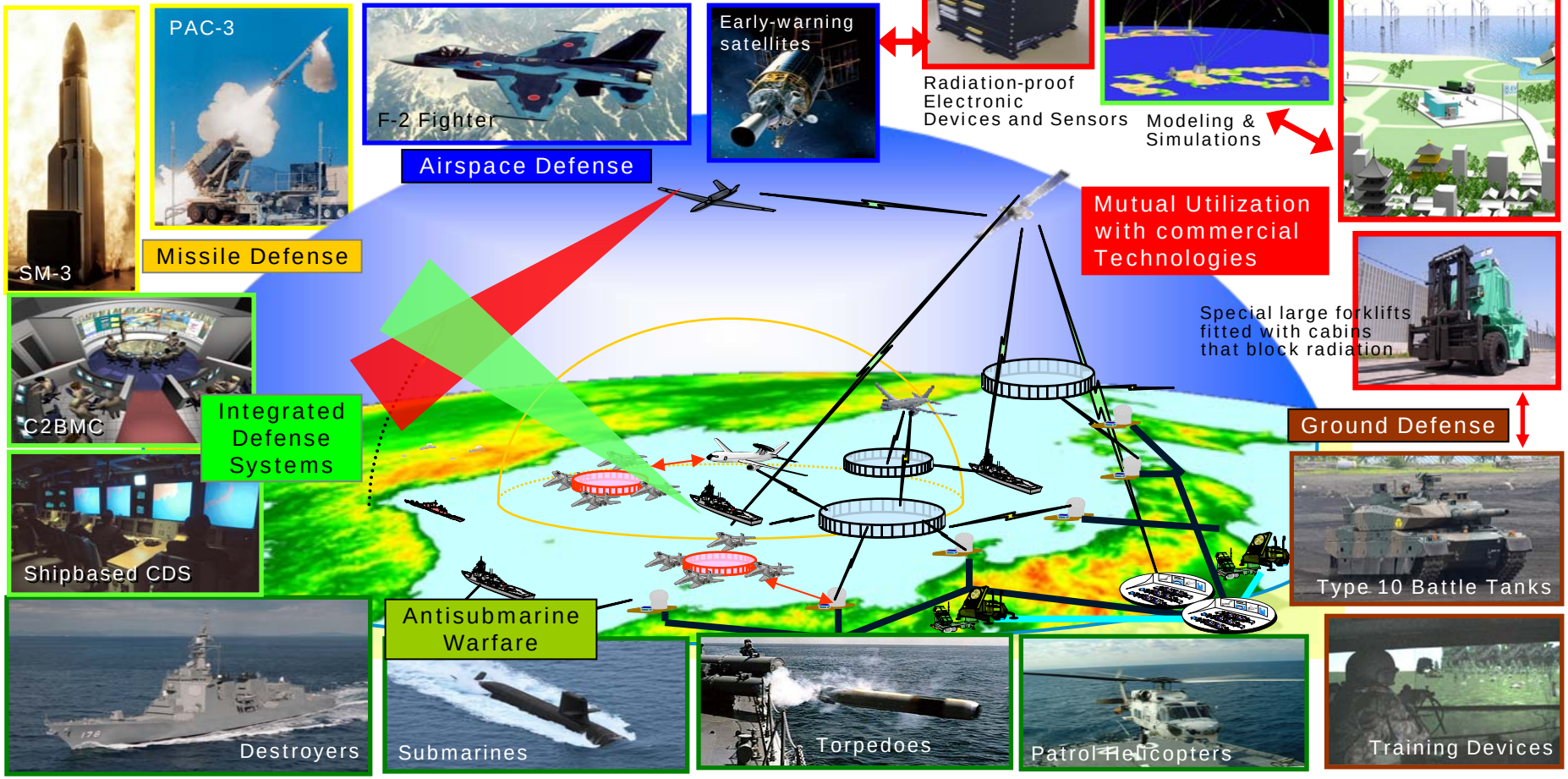
PAC-3 (From the Ministry of Defense website)



Advanced Technological Demonstrator-X
(From the Ministry of Defense website)

1) Propose integrated defense systems

- Propose integrated defense systems by coordinating businesses for land, sea and air
  Provide various products to efficiently support joint operating framework of JSDF
- Mutual application of defense / space technologies and commercial technologies



C2BMC:Command and Control, Battle Management, and Communications CDS:Comprehensive Display System

2) Sustain and enhance fighter aircraft production and technological bases.

- From platform manufacturer to weapon systems integrator for fighter aircraft.
- Conclude licensed production contract on F-35A production.
- Achieve indigenous production of the future fighter aircraft by acquiring state-of-the-art technologies through the Advanced Technology Demonstrator-X project, etc.

F-35A
(From the Ministry of Defense website)

Future Fighter Aircraft
(Data from the Ministry of Defense)

3) Promotion of international joint development and production

- Promote Japan-US joint development and production of next-generation SM-3 interceptor and supply parts to the U.S. at the production stage.
- Expand the business in response to the comprehensive exemption measures for Three Principles on Arms Exports.

SM-3 Being Launched from Aegis Destroyer (From the Ministry of Defense website)

Both the domestic budget for space and overseas demand for the launch of commercial satellites remain flat. Countries are making nationwide efforts to promote space development.

1) The H-II A Launch Vehicle No. 21 was launched successfully. In addition to a JAXA satellite, the Launch Vehicle No. 21 put the first satellite for overseas customers, the Korean Multi-Purpose Satellite 3 (KOMPSAT-3) into orbit successfully.

- In Japan, the restriction on the period for launches has been eliminated and the budget is being shifted from development to utilization.
- Globally, larger satellites are becoming more prevalent (those with a GTO weight exceeding 4 tons are the majority). Demand for the use of satellites has been increasing in emerging countries in Asia, Africa, and South America.

Successful launch of H-II A Launch Vehicle No. 21 (May 18, 2012)

2) Countries are promoting space development. Uses for private-sector initiatives are progressing.

- China is developing a large rocket for the construction of a space station. India is studying the human space activities, including lunar landing.
- The United States uses rockets from the private sector to ship supplies to the space station.

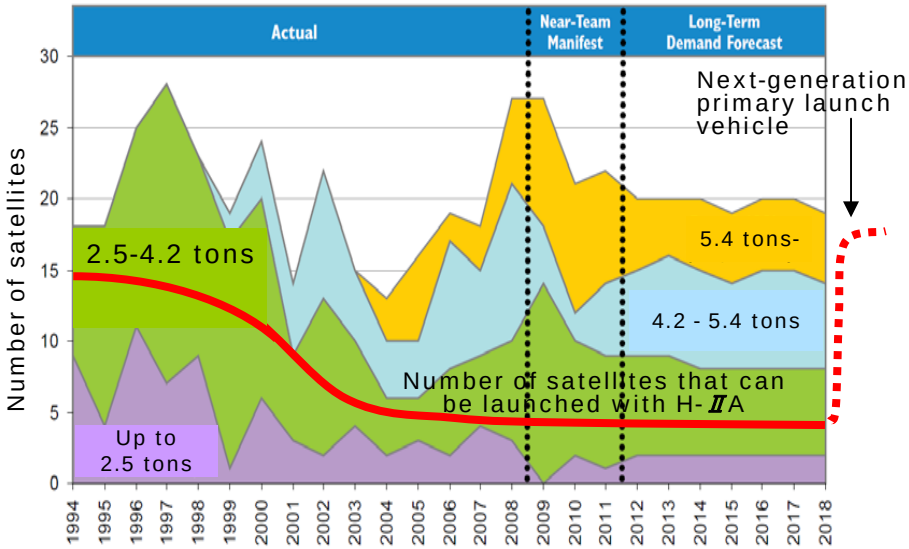
3) Progress in the shift from “non-military use” to “non-aggressive use”

- Preparations for the amendment to the JAXA law in Japan

Satellite launch plan for government use

Scheduled date	Rocket	Satellite
July 21, 2012	H-II B	HTV3 Kounotori
FY2013 or later	H-II B	HTV4 Kounotori
	H-II A	Global Precipitation Measurment Satellite (GPM)
	H-II A	Global Change Observation Mission 1st – Climate (GCOM-C1)
	H-II A	Advanced Land Observing Satellite – 2 (ALOS-2), etc.

Forecast of demand for commercial satellites



Quoted from “2011 Commercial Space Transportation Forecasts”, May 2010, FAA’s AST and COMSTAC.

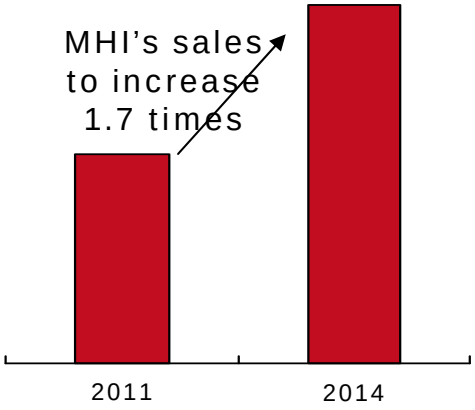
Improve the ability to launch and increase cost-competitiveness through the development of a next-generation primary launch vehicle. Lead Japan's space development as the leading company in space products.

1) Secure a base load for launch and transportation services, mainly with governmental demand. Promote activities for receiving orders, including those from overseas customers.

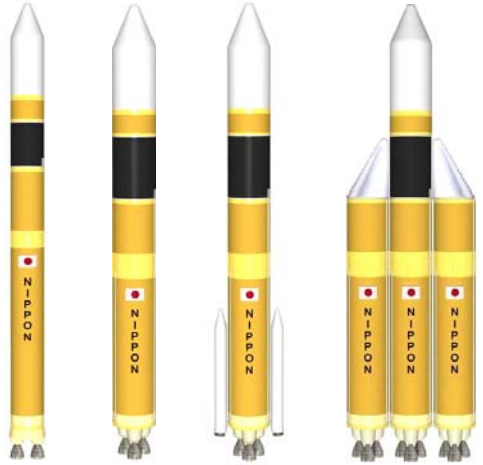
- Improve launching capabilities by upgrading two-stage rockets and developing next-generation primary launch vehicle to respond to diversified launch needs.
- Prepare for execute measures aimed at privatization after the successful launch of the H-IIB Launch Vehicle No.3.
- Suggest shared use with government satellites and promote exports of packages to emerging countries as methods for increasing price competitiveness so as to win orders from overseas customers.

2) Support the operation of the International Space Station and study the development of the human space activity

- Continue to succeed in reliably launching HTV.
- Launch new projects including HTV-R (with return functions).



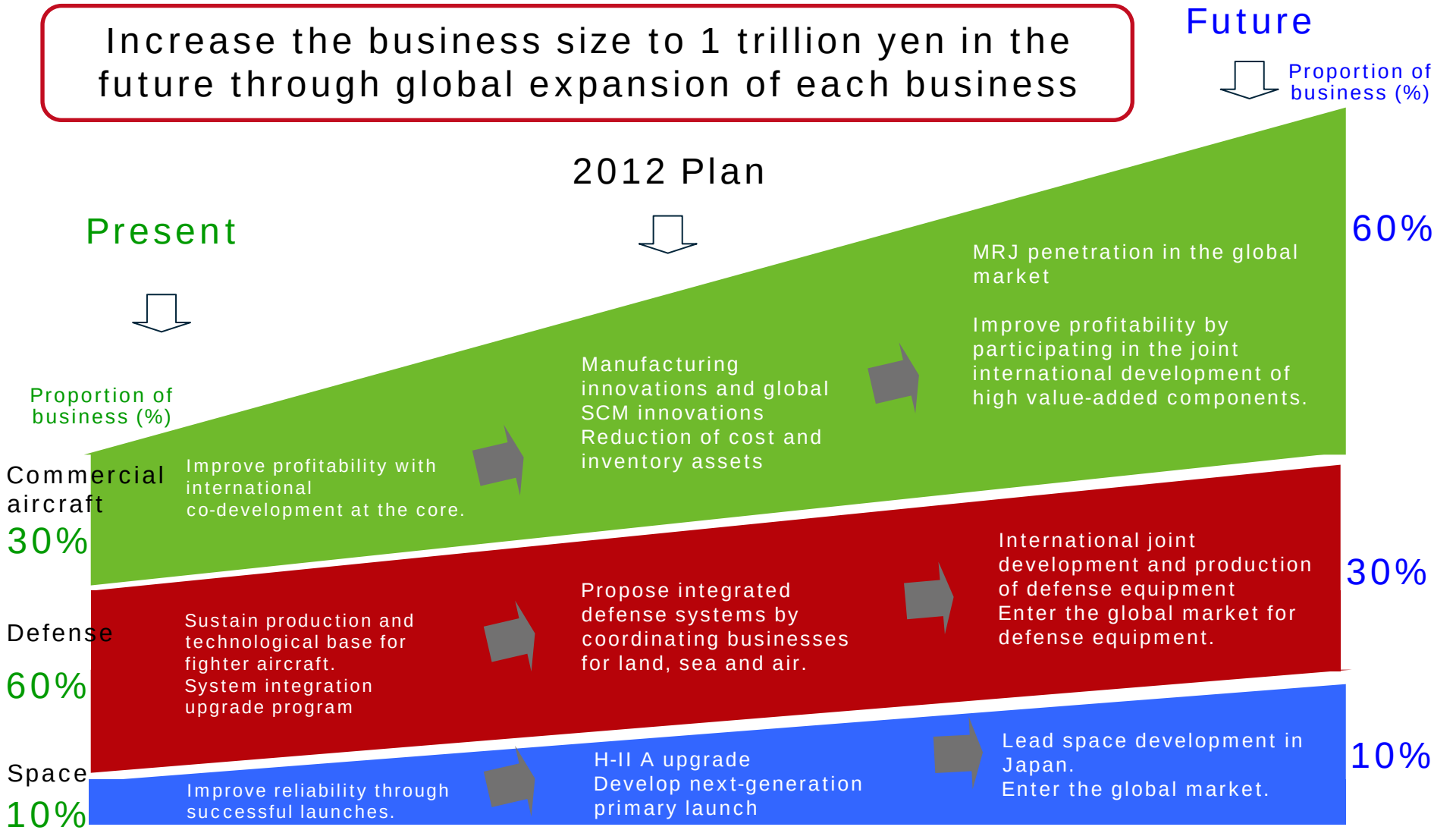
H-III Rocket Series (Tentative name)



An example of future rockets envisioned by MHI

- Product family sharing modules
- Modernization of electronic equipment
- Affordable, first-stage engine (LE-X engine)

Increase the business size to 1 trillion yen in the future through global expansion of each business



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