Japan: Aircraft Industry and Aeronautical Research Plan

Shinji Suzuki
University of Tokyo

Towards a Global Vision for Aeronautics
ICAS Sorrento Workshop – October 6, 2003

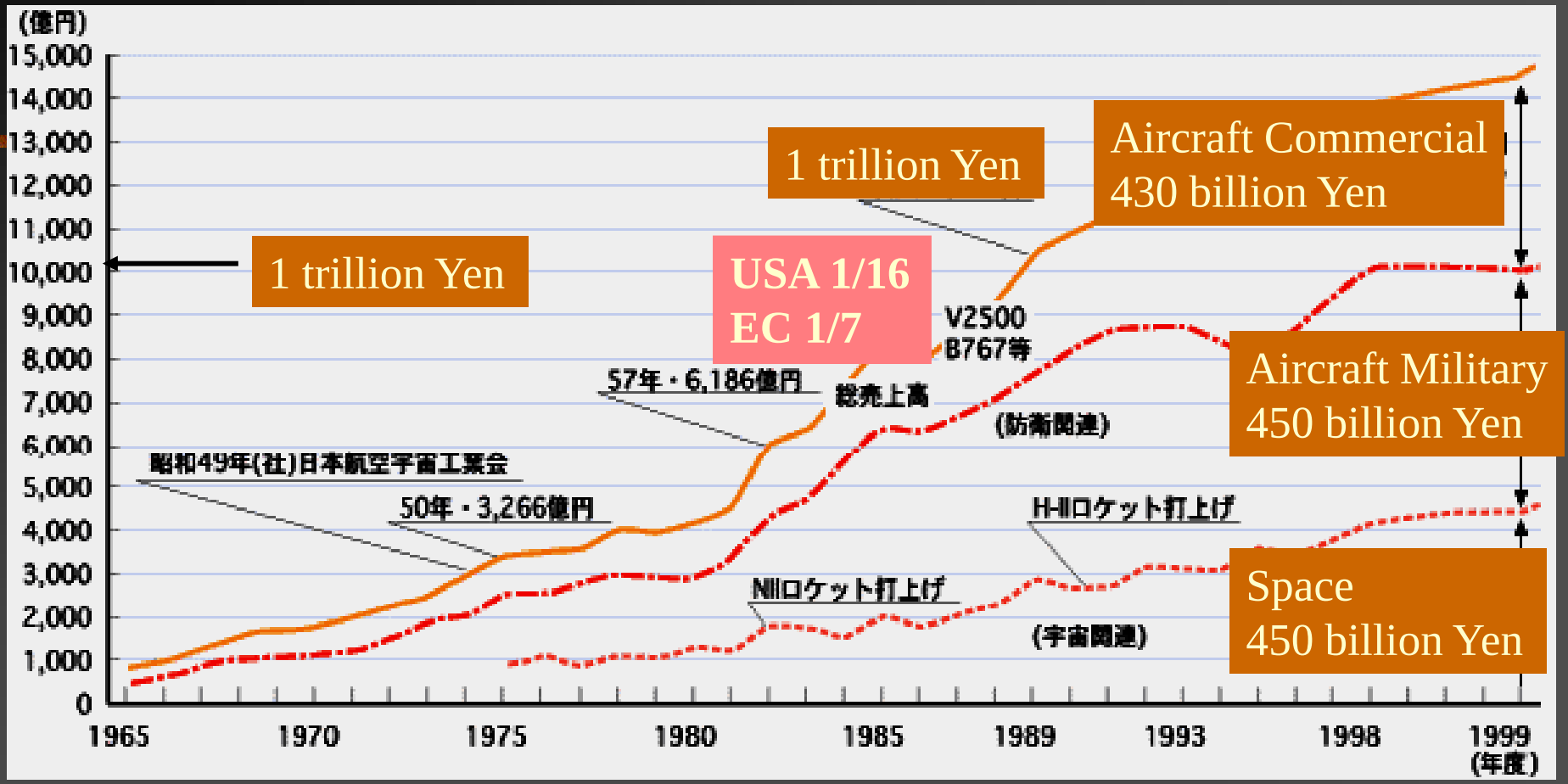
Outline

- Overview of Aircraft Industry & Air Transportation in Japan
- Advisory Report on Aeronautical R&D at JAXA
  - NAL (National Aerospace Lab.), NASDA (National Space Development Agency), and ISAS (Inst of Space & Aero Sciences) were integrated into JAXA (Japan Aerospace Exploration Agency)
- Research Activities at ENRI (Electric Navigation Research Institute)

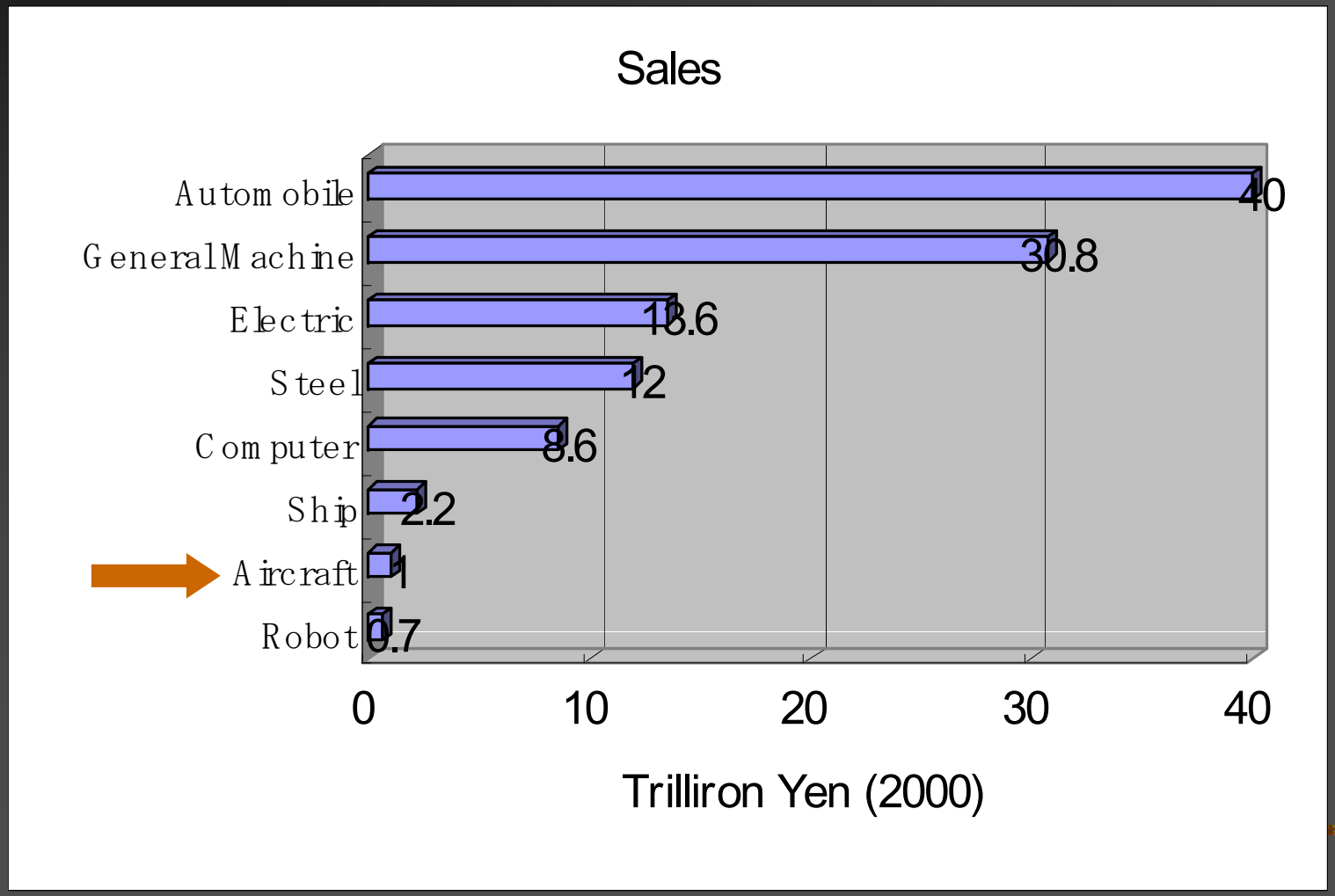
Aircraft Industry in Japan

- All Aviation Activities were reopened in 1952.
- Commercial
  - From Domestic to International
- Military
  - From License to Domestic

Annual Sales



Comparison with Different Areas



Aircraft Industry (Commercial 1)

- All Aviation Activities were reopened in 1952.
- First Big Project was YS-11 (60 seat turbo pop)
  - Nippon Aircraft Manufacturing Co. (60% Government)
  - First Flight 1962
  - Total Products 182 (82 exported)
  - Production ended in 1971 with a total loss of 36 billion yen.

Aircraft Industry (Commercial 2)

- MHI produced MU-200 (turbo prop) and MU-300 (jet)
- FHI produced FA-200
- Unsuccessful business

1978

1965

Aircraft Industry (Commercial 3)

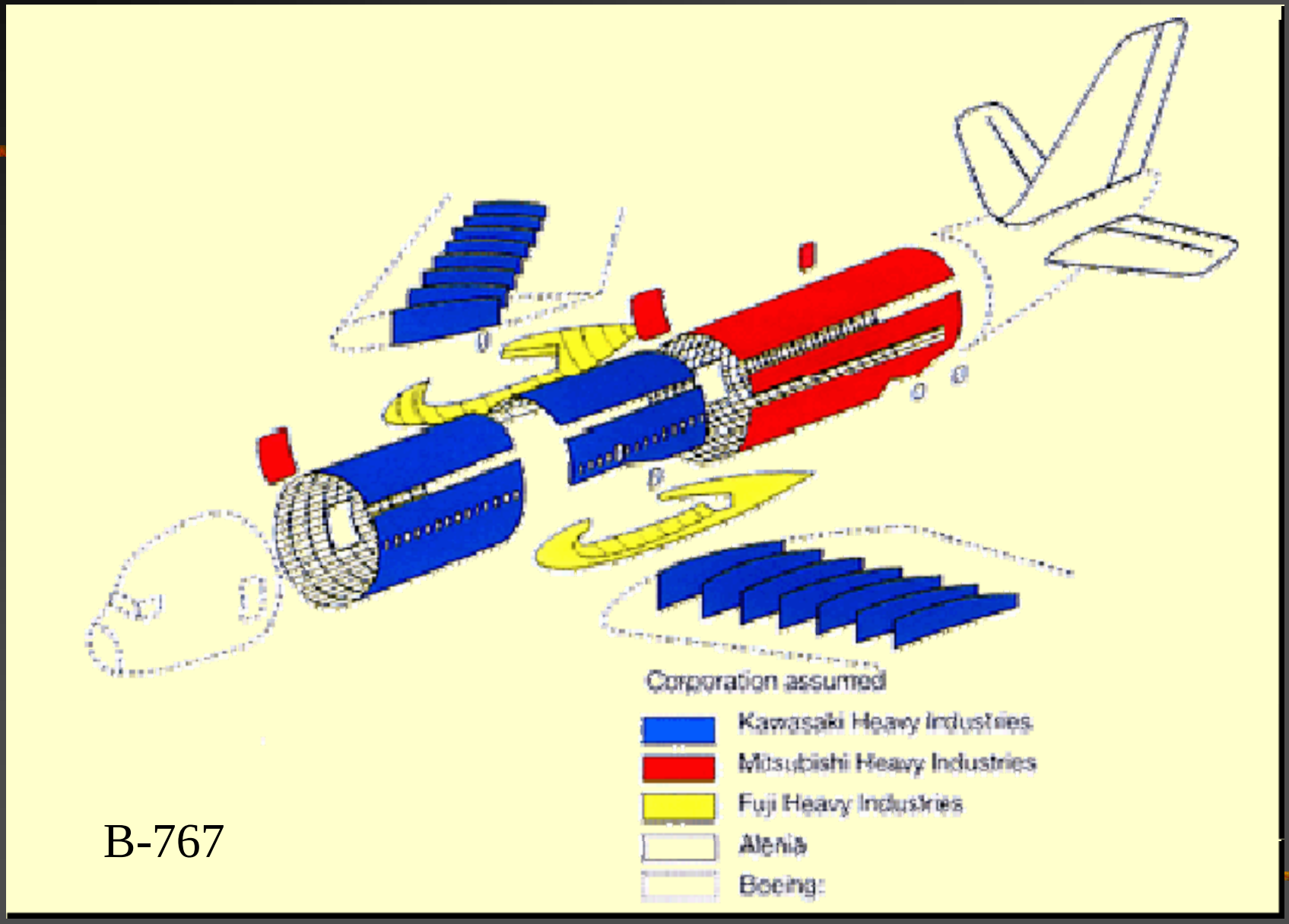
- Japanese participation in Boeing aircraft as risk sharing partners

1981 

1994 

- International Cooperation
  - MHI- Bombardier
  - KHI- Embraer
  - FHI- Rayseon

Embraer 170


Corporation assumed
Kawasaki Heavy Industries
Mitsubishi Heavy Industries
Fuji Heavy Industries
Alenia
Boeing:

B-767

Aircraft Industry (Commercial 4)

- We have been eager to develop new domestic passenger aircraft after YS-11
- 30-seat regional jet plan
  - Ministry of Economy, Trade and Industry project of R&D for high performance/environment adaptability of small size aircraft
- B-7E7

Aircraft Industry (Military 1)

- Product under license

1972

1981

- Original Design

T1 1958

US1 1967

F1 1971

Aircraft Industry (Military 2)

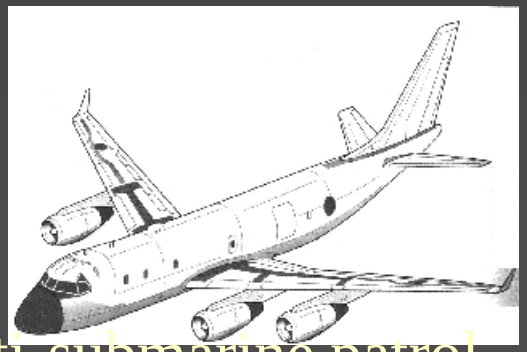
- International Cooperation

1995

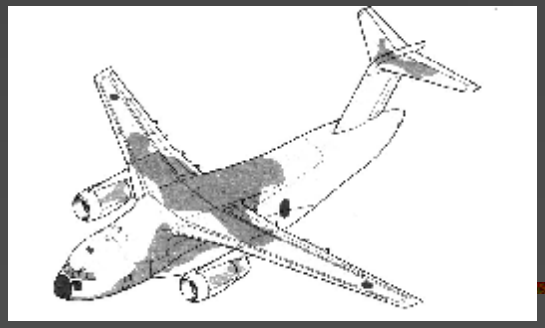
•Japan-US Design Team
•Co-cured composite wing structure
•Active phased array radar

Fighter-Support XF-2

- New Plan



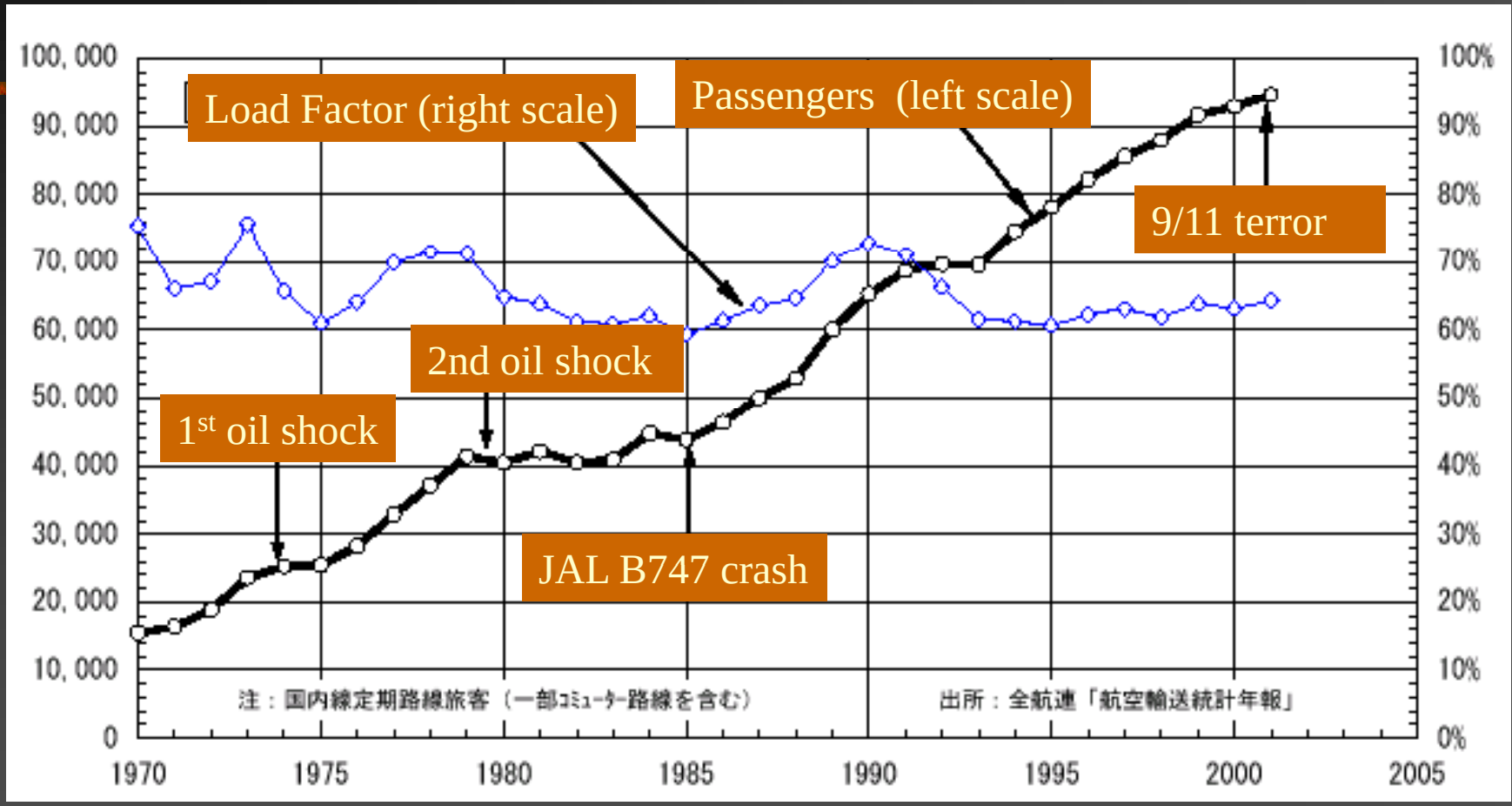
Anti-submarine patrol



Jet transport

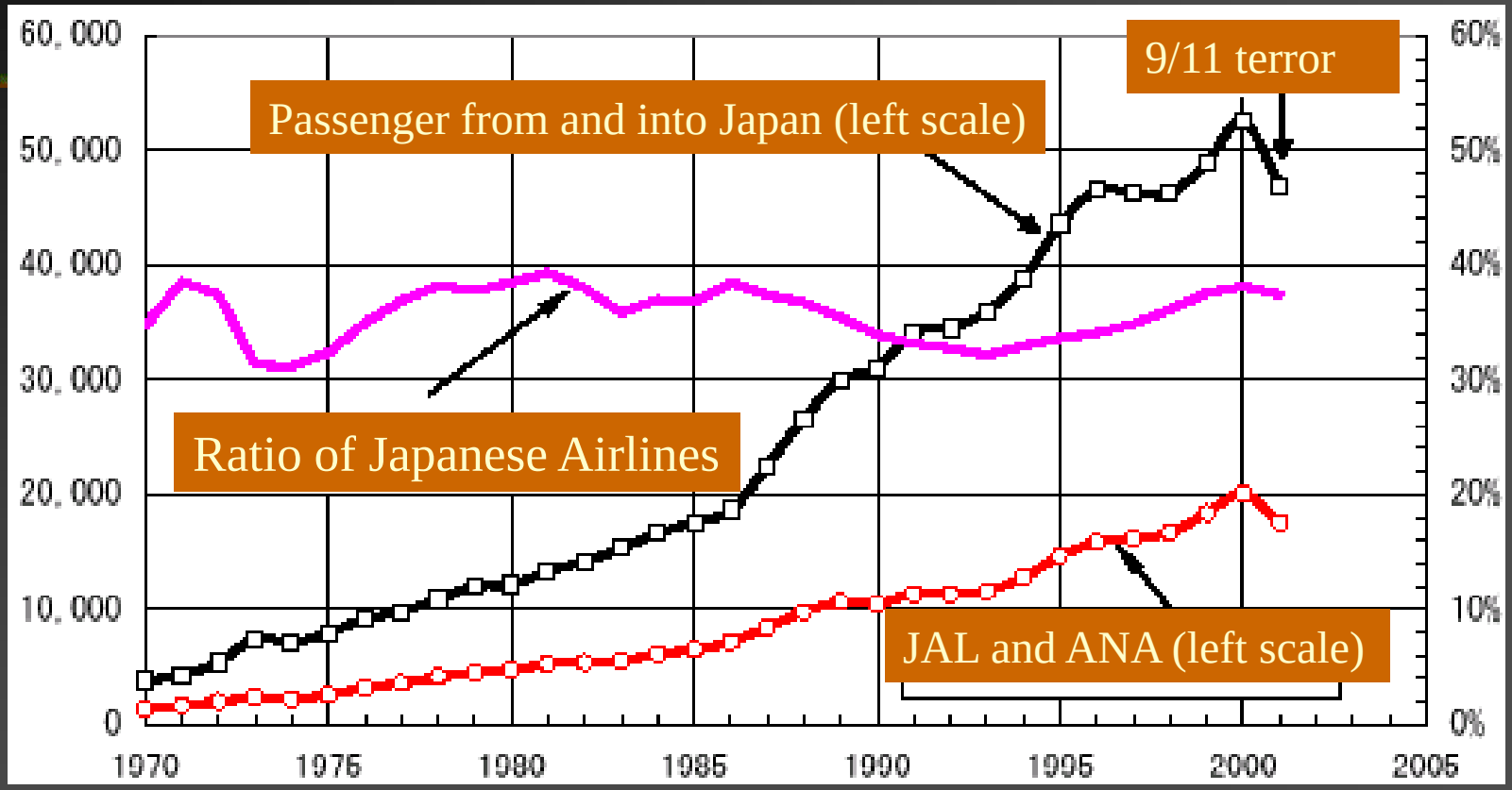
Air Transportation in Japan

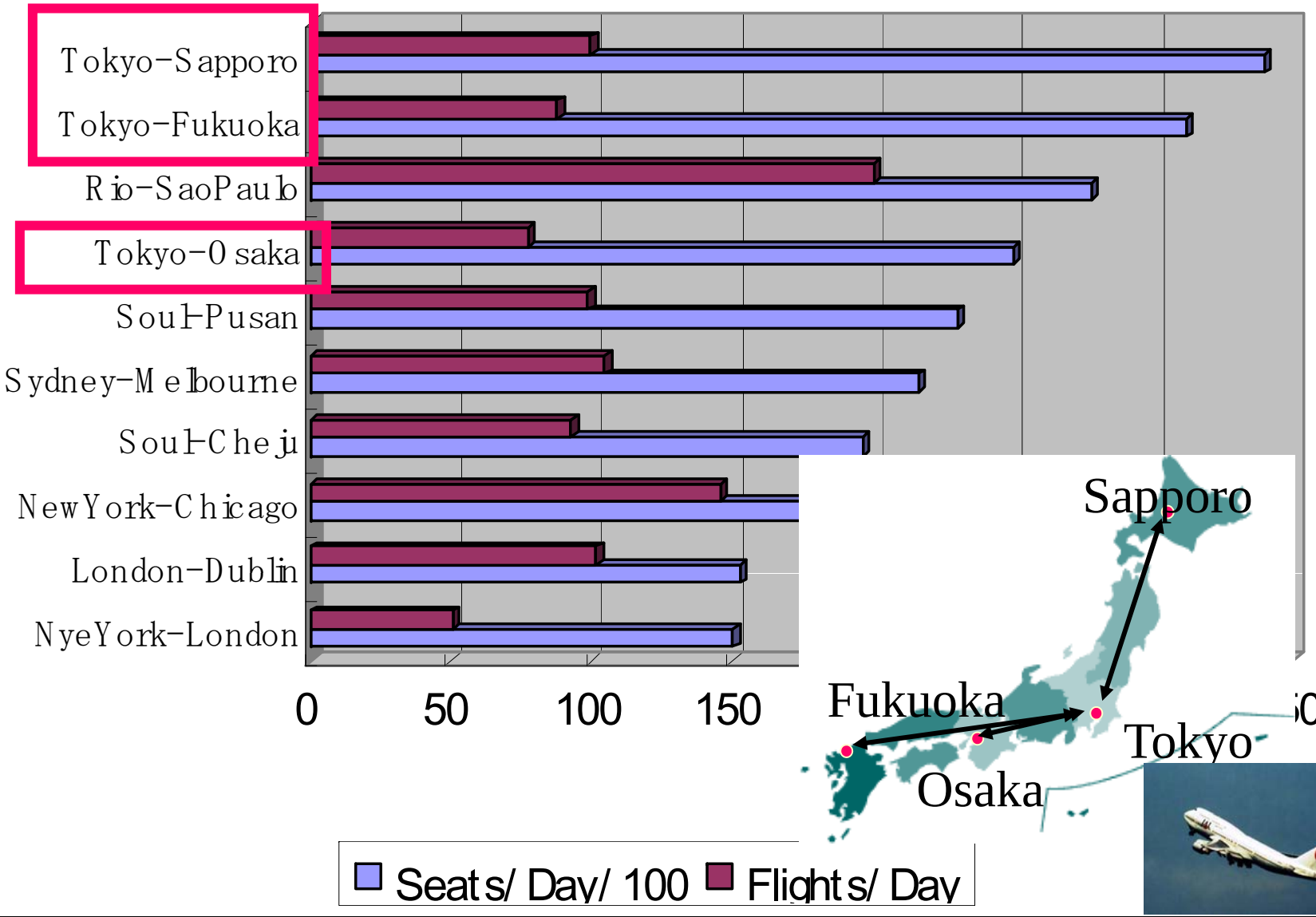
Domestic Air Transportation



year

International




Tokyo-Sapporo
Tokyo-Fukuoka
Rio-SaoPaulo
Tokyo-Osaka
Soul-Pusan
Sydney-Melbourne
Soul-Cheju
NewYork-Chicago
London-Dublin
NyeYork-London
0
50
100
150
Sapporo
Fukuoka
Tokyo
Osaka
Seats/ Day/ 100
Flights/ Day

Network of Bullet Train (Shinkansen)

- Big competition between high speed train and aircraft
- Need multi modal concept

Present line

Research Institutes

- Ministry of Education, Culture, Sports, Sciences and Technology (MECSST)
  - JAXA (Japan Aerospace Exploration Agency: ex NAL, NASDA, ISAS)
  - Universities
- Ministry of Land, Infrastructure and Transport
  - ENRI (Electric Navigation Research Institute)
- Japan Defense Agency
  - TRDI (Technical Research and Development Institute)
  - National Defense Academy

Promotion Plan of Aeronautical Sciences (2003/5)

- **Council for Science and Technology** in MECSST
  - Subdivision on R&D planning and Evaluation
- Advises for Aeronautical R&D Activities at JAXA in next 5-10 years

Main Points

- JAXA should meet society's requirements more sufficiently.
- JAXA should be struggling to develop long term research with higher risk.
- JAXA should focus on system technology including air transportation.
- JAXA should provide large scale research facilities.

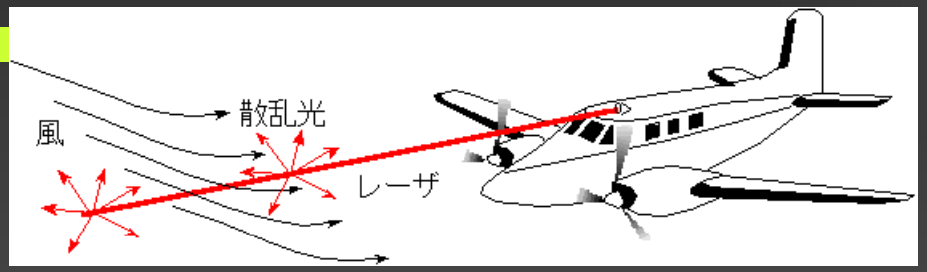
R&D for Domestic Aircraft Development

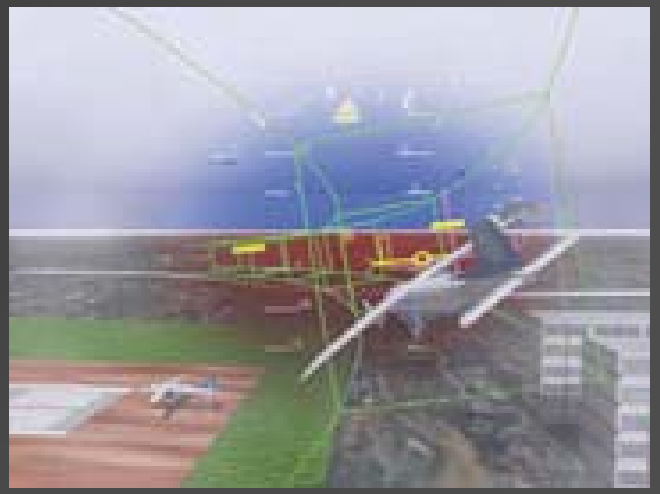
- Low Cost (20%)
- Quiet
- Low Fuel Consumption(20%)
- Low DOC (20%)
- Safety Structure
- CFD based Design
- Development of Small Jet Engine

METI plan

R&D for Safety Aircraft Operation

- Atmospheric Wind Sensor
  - Airborne Doppler Laser Rader (Lidar)





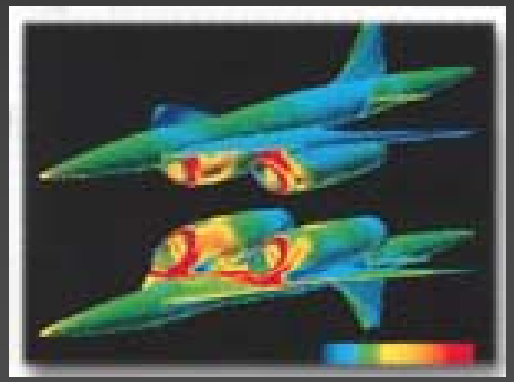
- Advanced Avionic System
- Man-Machine Interface

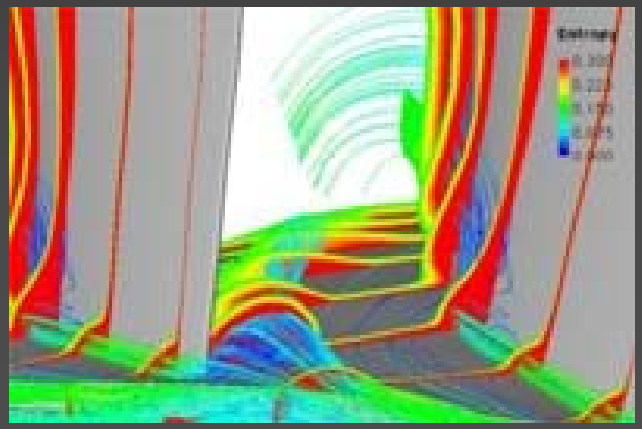
R&D contributing Safe and Reliable Society

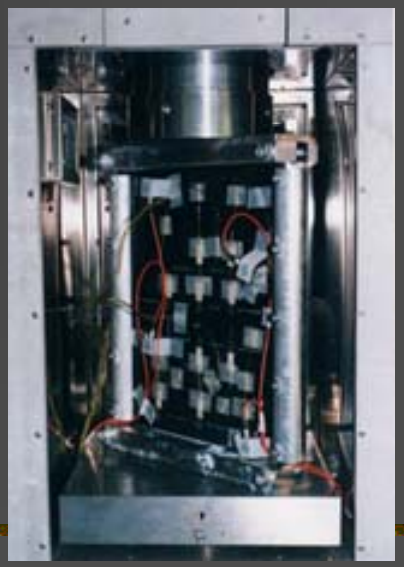
- UAV technology for Observation
- All Weather Helicopter Operation (Rescue & Doctor Helicopter)

R&D for Advanced Fundamental Technology

- CFD based Aircraft and Engine Design
- Composite Material
- Advanced Avionics





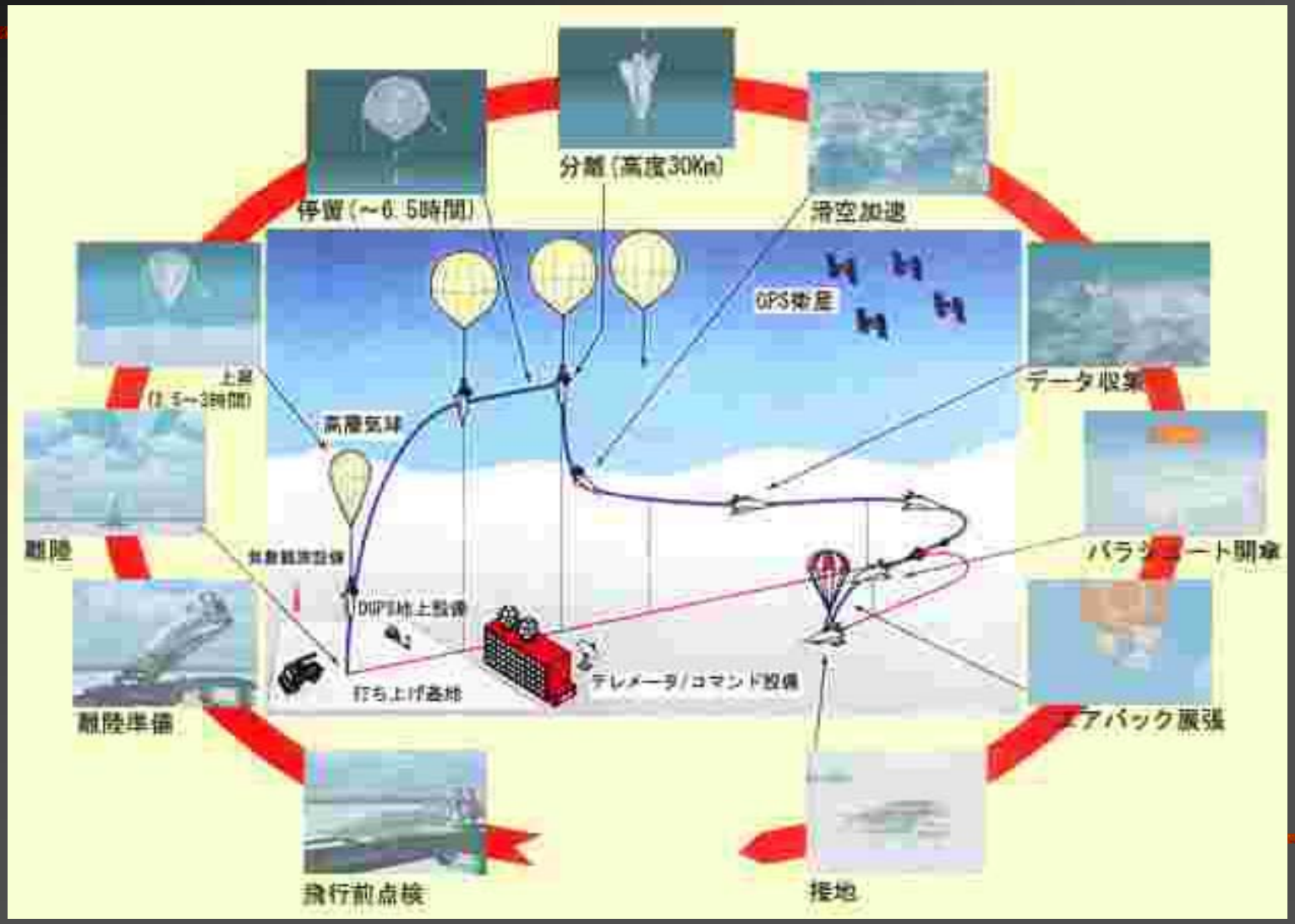


R&D for Innovative Technology

- Reusable Space Transportation System
- Stratosphere Platform
- SST
- V/STOL

High Speed Flight Demonstrator HSFD2

International Cooperation with France and Sweden



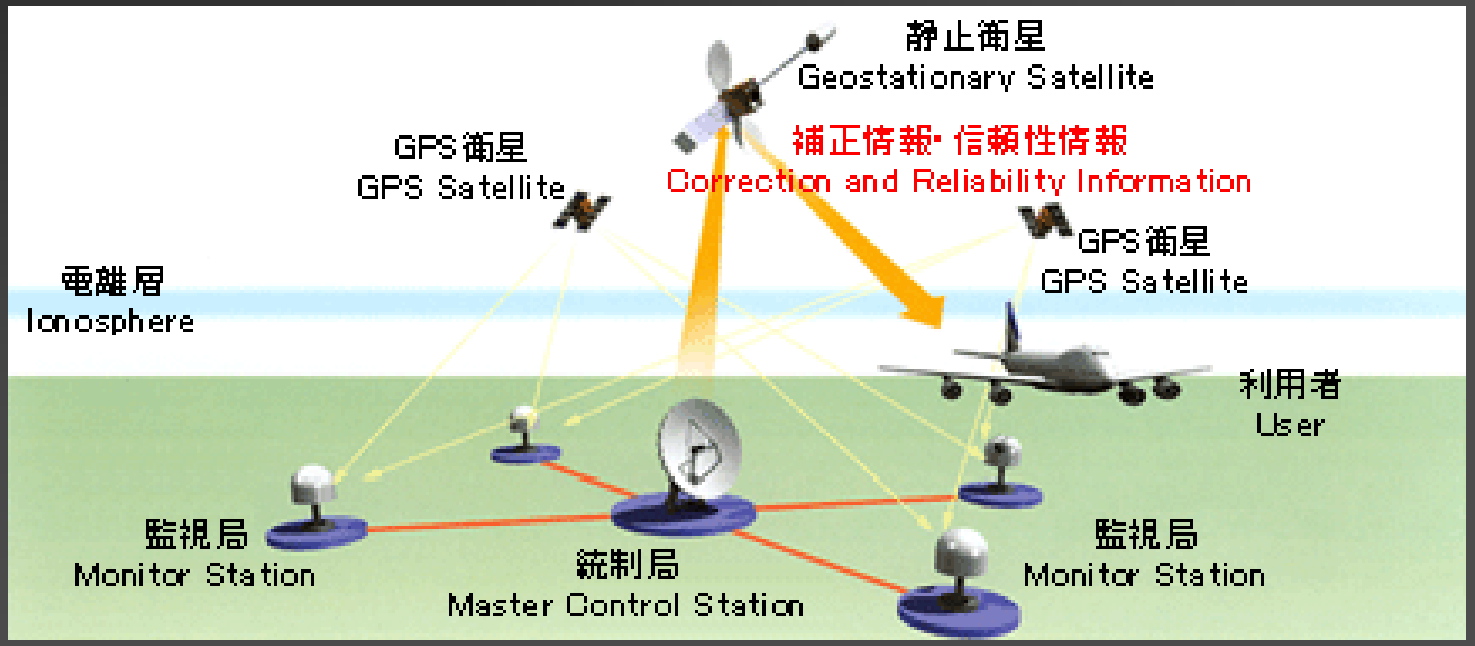
Main Researches at ENRI
Electric Navigation Research Institute

Communications

- Air Traffic Control Workstation

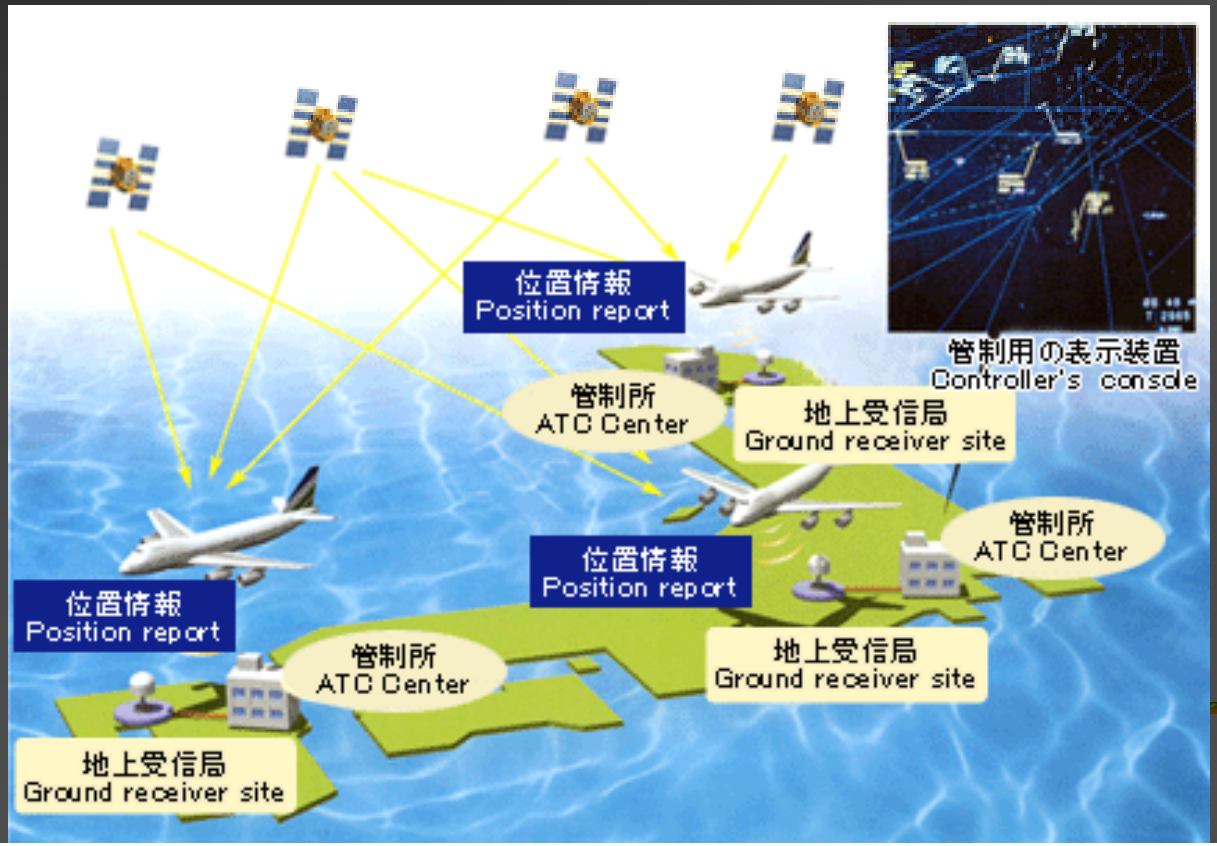
Navigation

- Satellite-Based Augmentation System



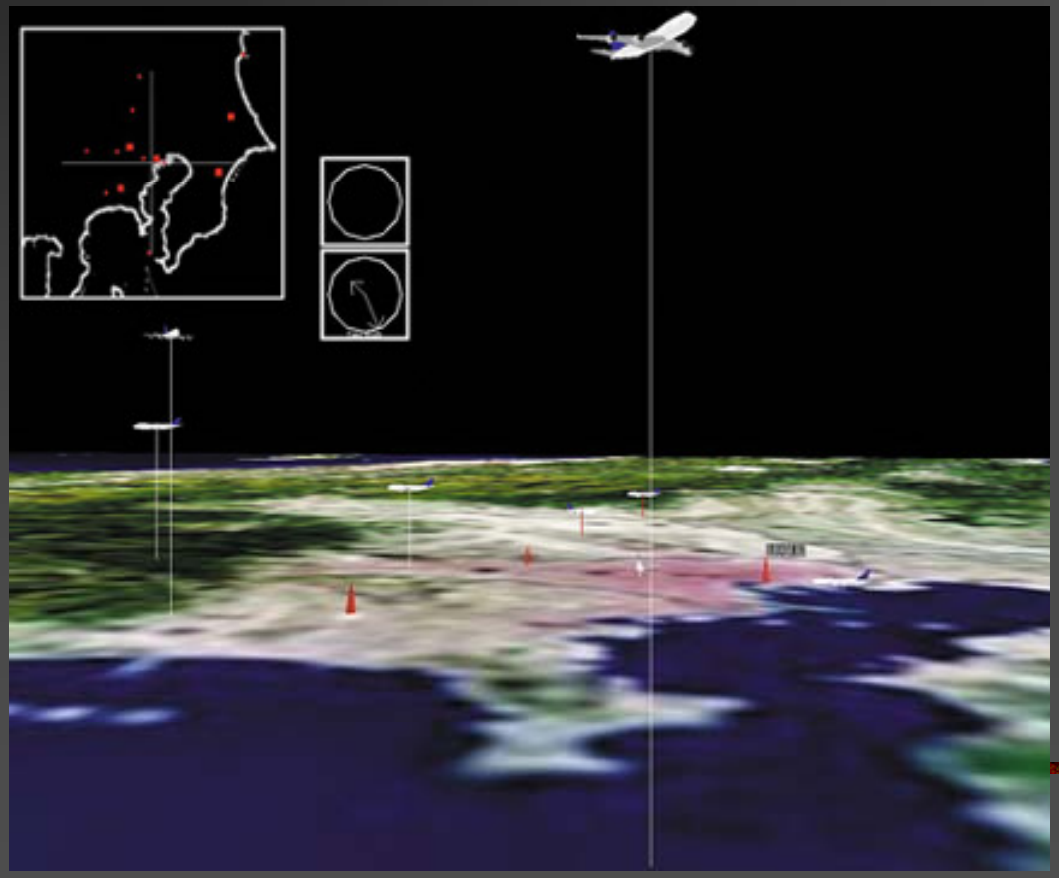
Surveillance

- Aircraft Surveillance by ADS-B
  - Automatic Dependent Surveillance-Broadcast



ATM

- Bird View Display



- All of the Japan's recent research activities in Aeronautical science will be presented in ICAS 2004 Yokohama Congress.
- Technical tours to JAXA Aeronautical research facilities and ENRI Navigation research facilities are arranged in ICAS 2004.