

Expectation for nano-satellite

~ The role to promote space industry~

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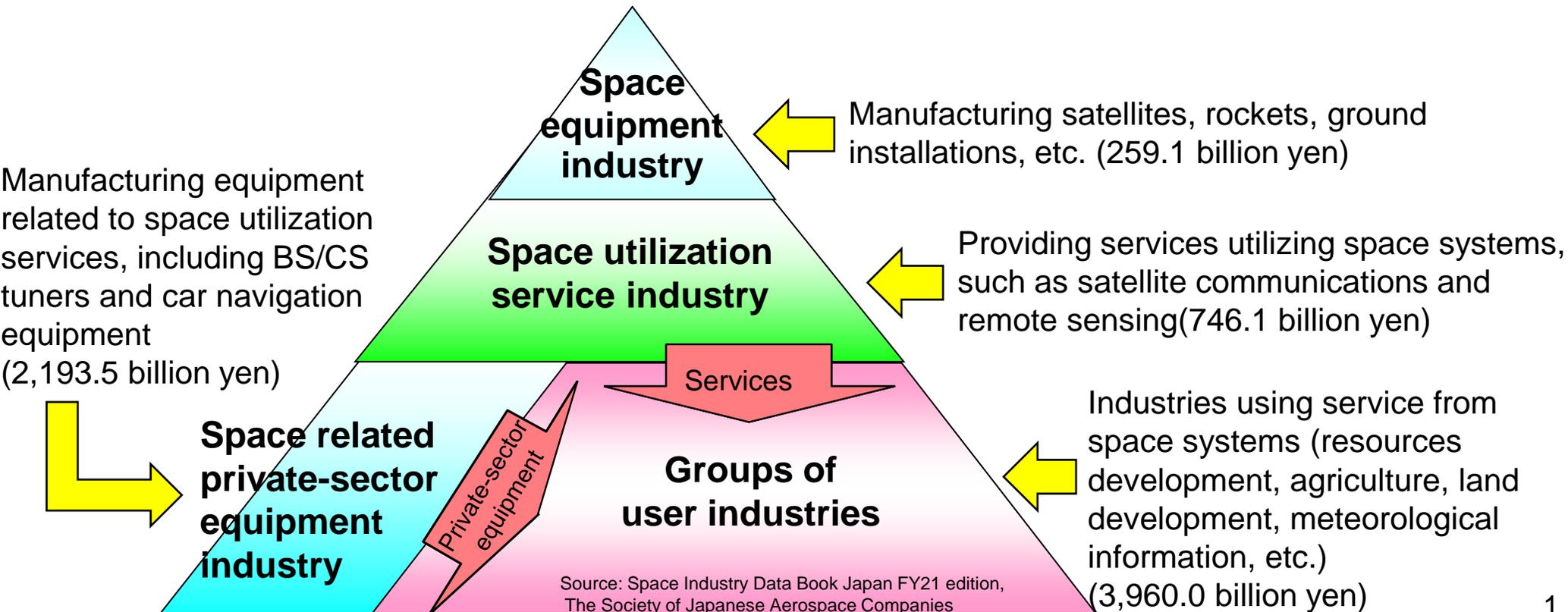
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Ministry of Economy, Trade and Industry

1. The present situation of the space industry: (1) Japan's domestic market

- Since the space industry represents a strategic role in national security, economic society, and science and technology, every country has been fostering its own space industry under respective government initiatives.
- The Japanese space industry covers several market fields, with the domestic market worth about 7 trillion yen.

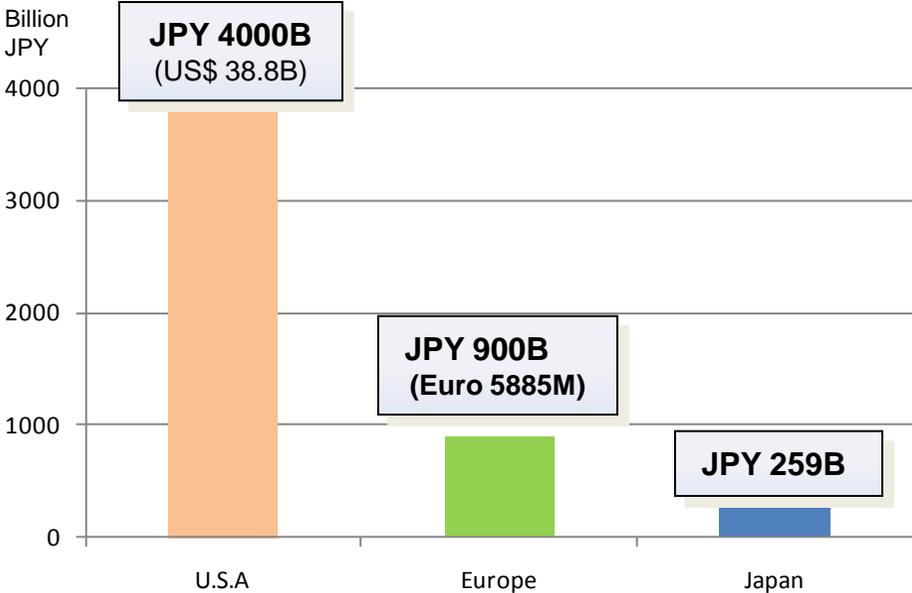
Market size of Japan's space industry (Total: 7,158.8 billion yen)



1. The present situation of the space industry: (2) Comparison in market size

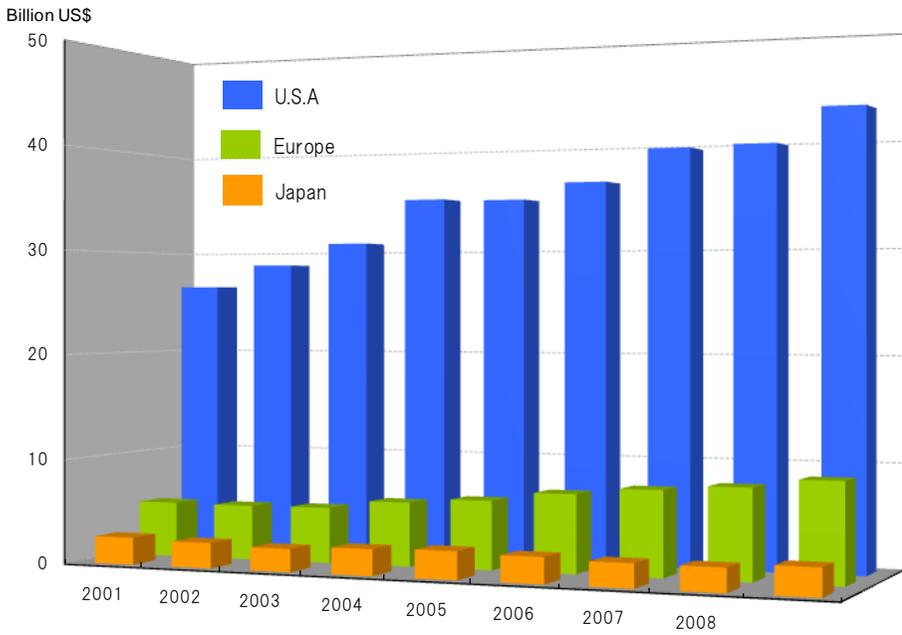
- Japan lags far behind Europe and the United States in market size of space equipment: ¥4.0 trillion in the U.S., ¥900 billion in Europe, ¥260 billion in Japan.
- Also, Japan has a smaller budget for space development.
- The key to the growth of Japanese space industry lays on overseas market and expansion of space systems utilization and its users.

Sales volume of space industry



Source: *Space Industry Data Book Japan 2008*, published by the Society of Japanese Aerospace Companies
Reference exchange rate: 1US\$=104JPY, 1Euro=154JPY

Space budget in Japan, U. S. & Europe

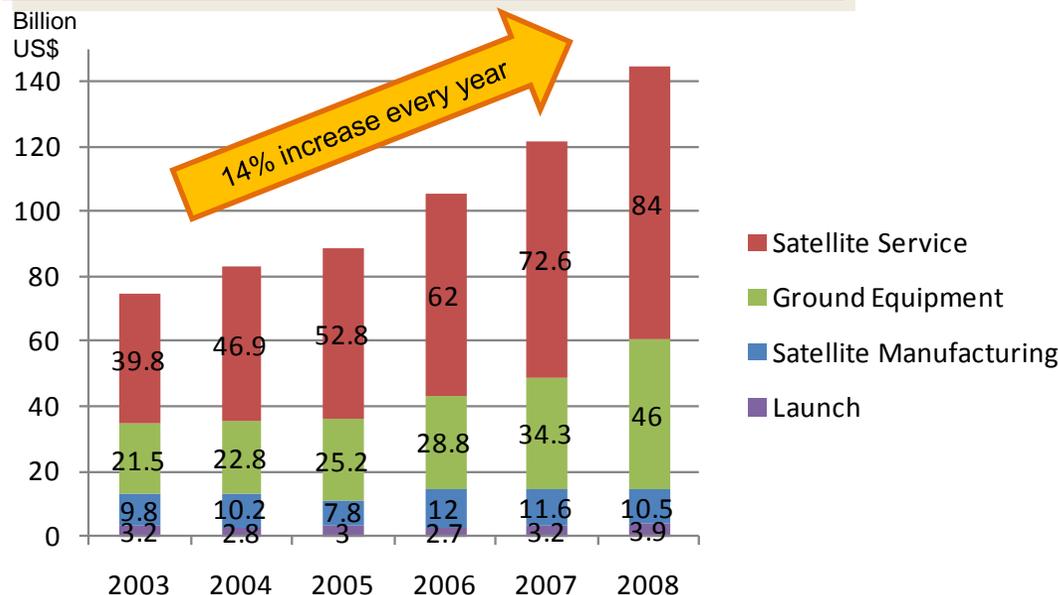


Source: *Space Industry Data Book Japan FY21*, published by the Society of Japanese Aerospace Companies
Exchange rates varies year by year in accordance with the average rates of each year.

1. The present situation of the space industry: (3) Outlook of the world market

- Satellites utilization has been extended world wide. The satellite market in newly developing countries that have little capability to develop satellites of their own is particularly promising in the future.
- While, the largest commercial market is for communications and broadcasting satellites at present, demand for earth observation satellites has been growing in recent years.
- Forecasted launch projects of earth observation satellites increase up to 260 (2009–2018) from 128(1999–2008), especially, the number of satellite owned by developing countries will increase 4 times as many as the last 10 years.

Sales volume of space industry



Current launch by emerging countries

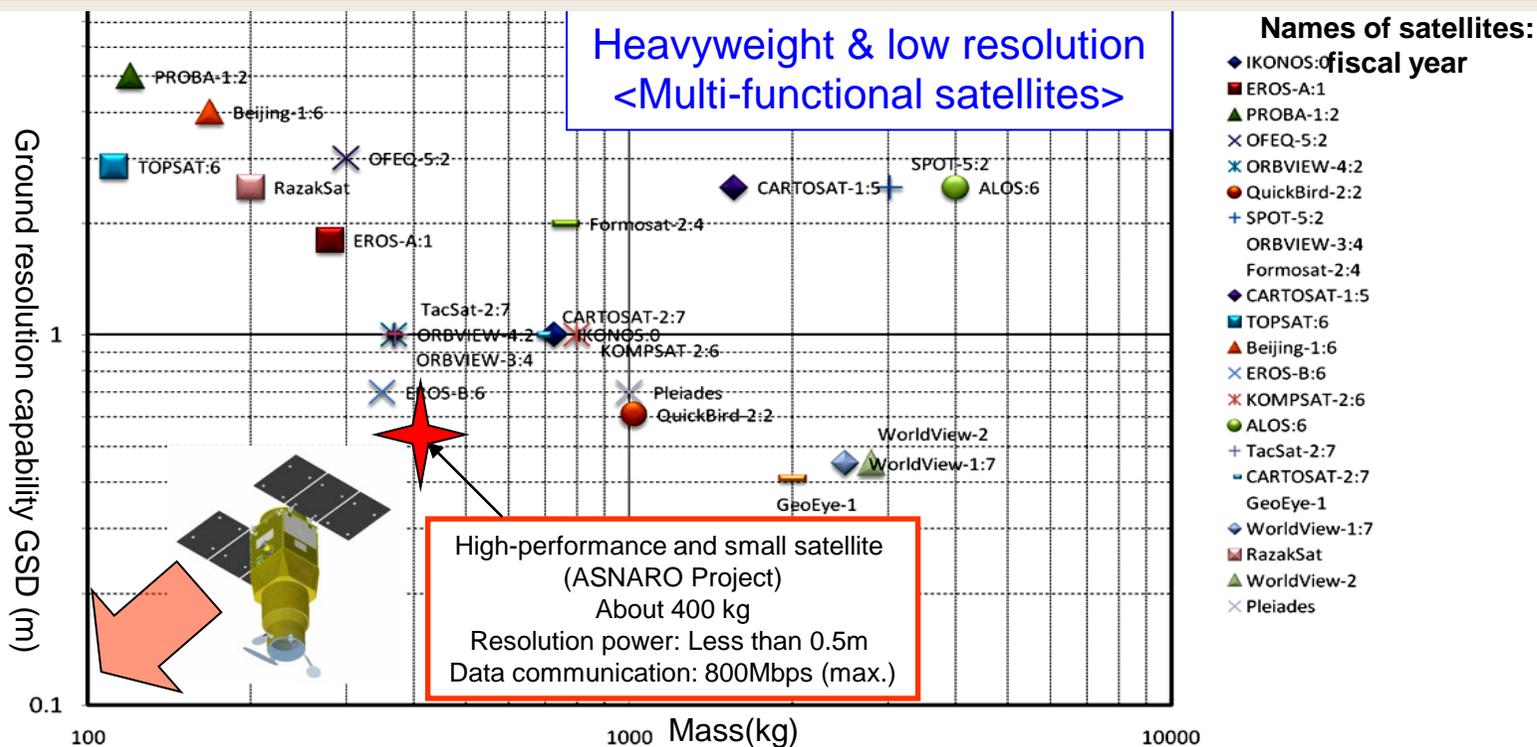
Country	Satellite (launch date)
Vietnam	Vinasat (2008/4)
Thailand	THEOS (2008/10)
Iran	Omid (2009/2)
Malaysia	Razaksat (2009/7)
UAE	Dubaisat-1 (2009/7)
South Africa	Sumbandia (2009/9)
Algeria	Alsatsat- 2 (2010/6)

Source: Satellite Industry Association [State of the Satellite Industry Report(2009)]

2. Approach to overseas deployment of Japanese space systems

- It is essential to develop “saleable” satellite systems and technologies that lead to practical use, instead of making research an end per se, as in the past.
- There has been increasing demand for small satellites so as to fulfill users’ requirements for “low cost, quick delivery, high performance, and high reliability.”
- METI is undertaking the small satellite development project comparable to the world’s most advanced commercial satellites by utilizing the miniaturization technologies and consumer electronic parts.

Correlation between the weight of a satellite and ground sample distance (GSD)



2. Approach to overseas deployment of Japanese space systems

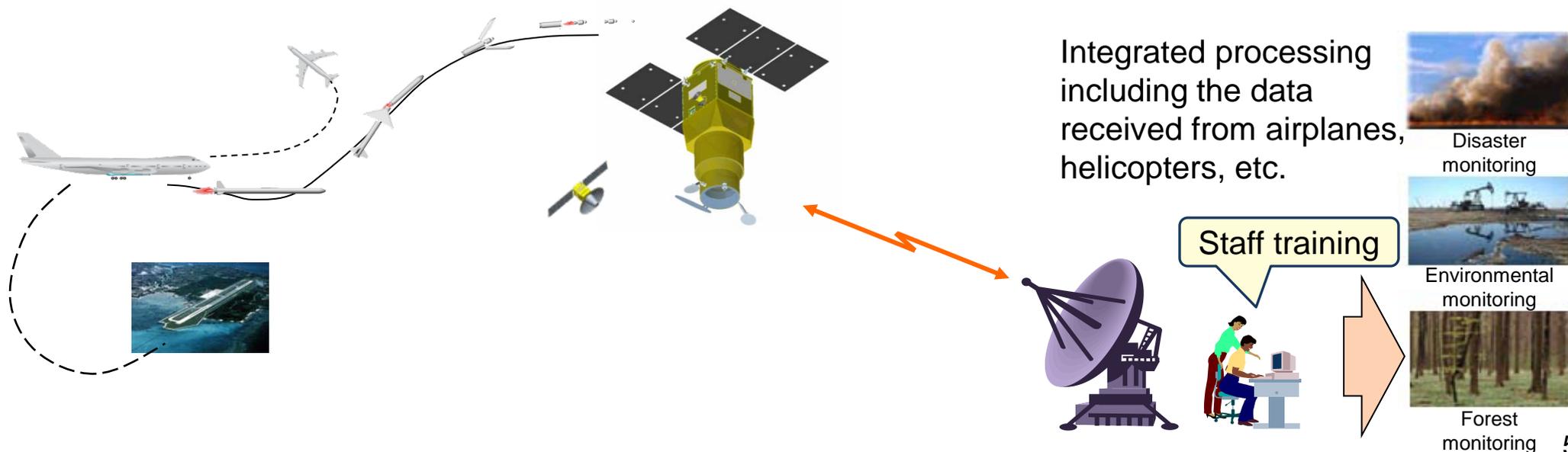
- The demand increases for the systems combining satellites, rocket, ground station, data service and human capacity training in the developing countries.
- It is therefore necessary to enhance competitiveness of the whole space system as a package: small & nano satellite, ground station, small-sized solid launcher, air-launch system, and constellation & formation flight.

An image of satellite system package

Air-launch system

Small & Nano satellites

Ground station & data service



3. Approach to expand utilization of space systems: Expectation for nano-satellite

- Nano satellite has huge potential for the innovation in technology demonstration and utilization of space systems by realizing very low cost & short time delivery, despite some limitations such as lifetime and resolution accuracy.
- Also, stimulation of new ideas through nano satellite project contributes to the promotion of new entry to space industry.
- Coordinated operation of a number of satellites make it possible to gather information at high-frequency rate, required for various issues such as natural disaster, Earth's environment and crop field monitoring.

Detailed monitoring with various satellites

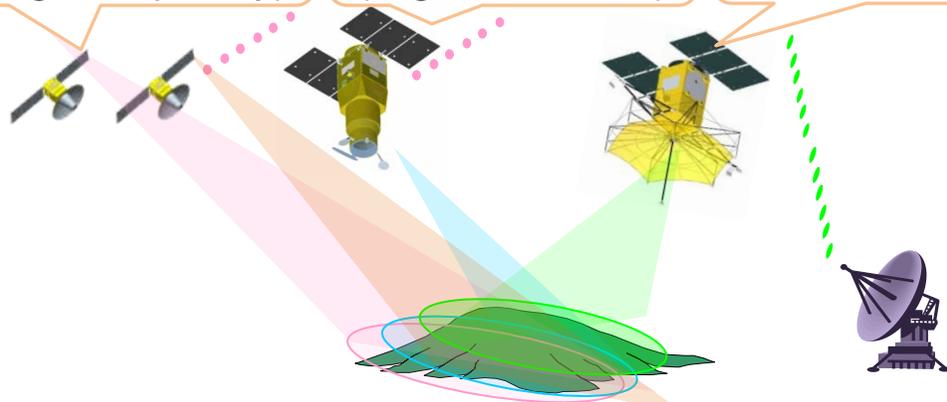
Data Relay Satellite
(possibly through
optical communication)



nano-sat.
(High-frequency)

small-sat.
(High-resolution)

medium-sat.
(Wide-coverage)



Nano satellite next generation

Mass
(kg)

1000

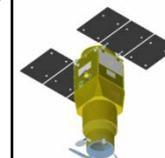
500

100

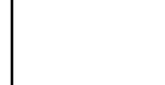
50



Medium sat.



Small sat.



Nano sat.
(next generation)

0.5m 1m 2m



Nano sat.
(at present)

5m

Resolution accuracy