

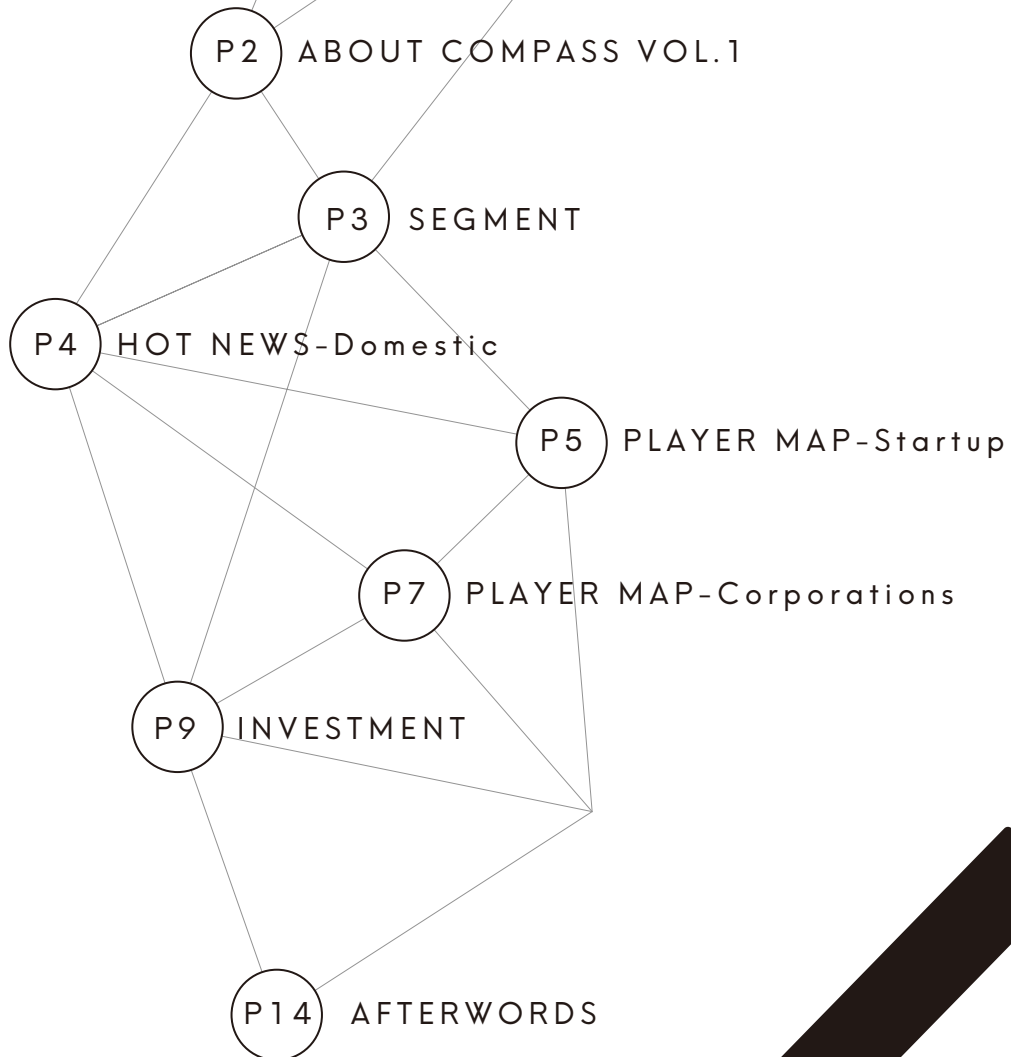
COM PASS

vol.1



SPACETIDE

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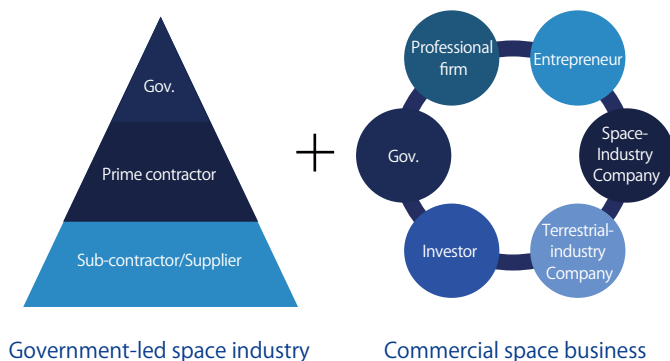


COMPASS

SPACETIDE COMPASS vol.1(Summer 2019)

Introduction

NEW ECOSYSTEM



The international space industry is undergoing a paradigm shift. Whereas previously the space industry has been led by mainly the government, leadership by the private sector has been a gaining momentum in recent years.

Over the past decade, more than 30 countries and regions have invested in space-related businesses, and over 1000 startups have been launched. Various companies from terrestrial industries have also entered and invested in space-related businesses. Thus, today organizations and people from a wide range of fields have joined or are discussing various business possibilities in the new space industry. In Japan, too, interest in the space industry is growing in both the public and private sectors, and signs of a new industrial eco-system have begun to appear.

SPACETIDE plans and manages the largest annual space business conference in Japan, as well as a variety of small networking events. As a new activities, we have also started to publish our own industry report: "SPACETIDE COMPASS".

SPACETIDE COMPASS published vol. 0 as the first issue in December 2018. Vol. 0 summarized domestic space business macro trend including player map with 30+ startups, and investment trend of 30 billion yen in past 2 years.

It has been viewed and referenced by a broad audience within space industry including government agencies, JAXA, space and terrestrial corporations, private and public researchers

Encouraged by the responses, we are proud to introduce SPACETIDE COMPASS Vol. 1 (Summer 2019). This journal is split into two sections; First half will provide updates on player and investment trend. Second part will introduce activities of terrestrial corporation that are growing presence in space industry.

*1: As of May 2019

Current space businesses can be categorized into 6 segments.

Satellite data space tech application

Business utilizing satellite data and various space tech (mainly ground-based) and its related businesses

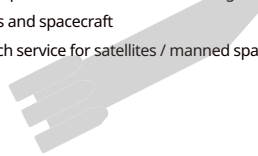
- Satellite data distribution
- Satellite data solution services, using analyzed / processed satellite data
- Satellite communication service



Launch service

Commercial / manned space flight business and its related businesses

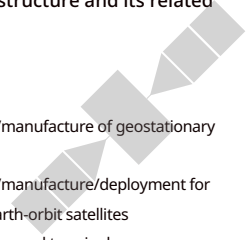
- Development and manufacture of large/small rockets and spacecraft
- Launch service for satellites / manned space flight



Satellite infrastructure deployment and operation

Business deploying and operating satellite infrastructure and its related businesses

- Development/manufacture of geostationary satellites
- Development/manufacture/deployment for low/medium earth-orbit satellites
- Ground facilities and terminal



On-orbit service

Business providing service to orbiting artifacts and its related businesses

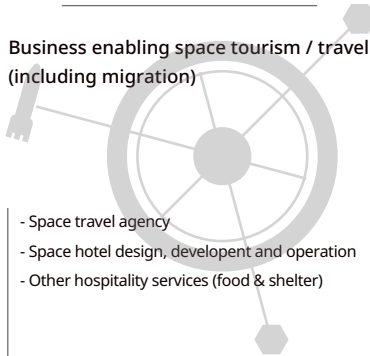
- Satellite life extension
- In space R&D and manufacturing
- Debris removal



Space tourism migration

Business enabling space tourism / travel (including migration)

- Space travel agency
- Space hotel design, development and operation
- Other hospitality services (food & shelter)



Space exploration space mining

Business for deep space and its related businesses

- Space probe / rover development and manufacture
- Lunar / Mars base / infrastructure planning, design and operation



Satellite data space tech application

Announced launch of a satellite data platform, making satellite data more accessible

In Nov. 2018, Space BD and Z-kai announced partnership in establishing space education business within JAXA's Space Innovation Partnership "J-SPARC"

In Nov. 2018, Mercari R4D announced exploring satellite data application to solve social issues within J-SPARC

In Feb. 2019, Sakura Internet released open and free satellite data platform "Tellus"

In Feb. 2019, Dynamic Map Platform conducted a demonstration experiment of high-precision 3D map "Dynamic Map" for autonomous driving application



Launch service

Launcher startups are making progress towards commercialization

In Mar. 2019, "Space One" announced construction of small rocket launch site in Wakayama prefecture

In May 2019, InterstellarTechnologies became the first Japanese private rocket company to successfully reach 100 km altitude with its rocket



Satellite infrastructure deployment and operation

A satellite startup conducted its first successful satellite launch. A major satellite manufacturer conducted its first successful foreign ordered satellite launch.

In Nov. 2018, Mitsubishi Electric launched "Es' hail-2", the first Japan-made satellite ordered from Arab countries

In Dec. 2018, Axelspace made a major fundraising. In the same month, a small satellite developed by Axelspace was successfully launched from Russia

In Jan. 2019, Infostellar signed a partnership with SAC to expand ground station utilization

In Feb. 2019, OneWeb, funded by Softbank, successfully launched six satellites. Plans to construct +600 satellite constellation

On-orbit service

Space debris removal projects continue to be a hot topic in Japan

In Nov. 2018, a space debris removal startup AstroScale, raised a large scale funding

In Feb. 2019, ALE embarked on the development of equipment that prevent space debris diffusion within "J-SPARC"



Space tourism migration

Variety of programs are launched, including space port and food security

In Nov. 2018, establishment of Space Port Japan was announced. Accelerates the activities to launch a space port in Japan by

In Mar. 2019, project "Space Food X" was launched as a part of "J-SPARC"

+30 companies have joined the project aimed to solve food security issues both in space and on the earth, and to accelerate market creation



Space exploration space mining

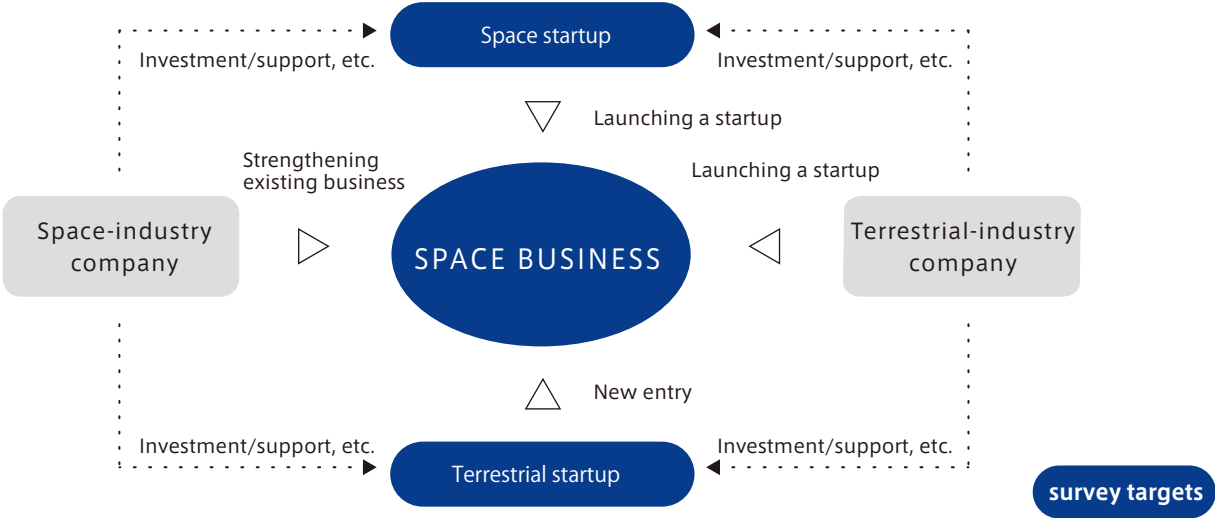
Big moves are made by Japanese startups and large corporation towards lunar exploration

In Nov. 2018, several teams were awarded for commercial payload service (CLPS), including Draper Institute team with ispace. And in Feb. 2019, ispace announced a new support company to further accelerate lunar exploration

In Mar. 2019, JAXA and Toyota announced their intent to collaborate in international space exploration missions. As a start, both parties plans to explore opportunities to collaborate in development of pressurized crewed rover



Space business entry approach and vol. 1 research scope



Player map by business segment

Various startups are emerging in each segment

Satellite data / space tech application

- Axelspace
- ALE
- Dynamic Map Platform
- Global Positioning Augmentation Service
- GREE
- mercariR4D
- Polar Star Space
- Ridge-i
- SAGri
- SIGNATE
- Space Shift
- Space Bio-Laboratories
- Synspective
- Umitron

Launch service

- Interstellar Technologies
- PD Aerospace
- SpaceWalker
- SpaceBD
- SpaceOne
- Astro Ocean

Satellite infrastructure deployment and operation

- Axelspace
- Infostellar
- Institute for Q-shu Pioneers of Space
- WARPSPACE

On-orbit service

- ALE
- Astroscale
- SpaceBD

Space tourism/migration

- Club Tourism Space Tours
- euglena
- Integriculture
- ONETABLE
- OUTSENSE
- PD Aerospace
- SpaceWalker
- Yspace

Space exploration/space mining

- GITAI
- ispace
- MELTIN MMI
- Telexistence

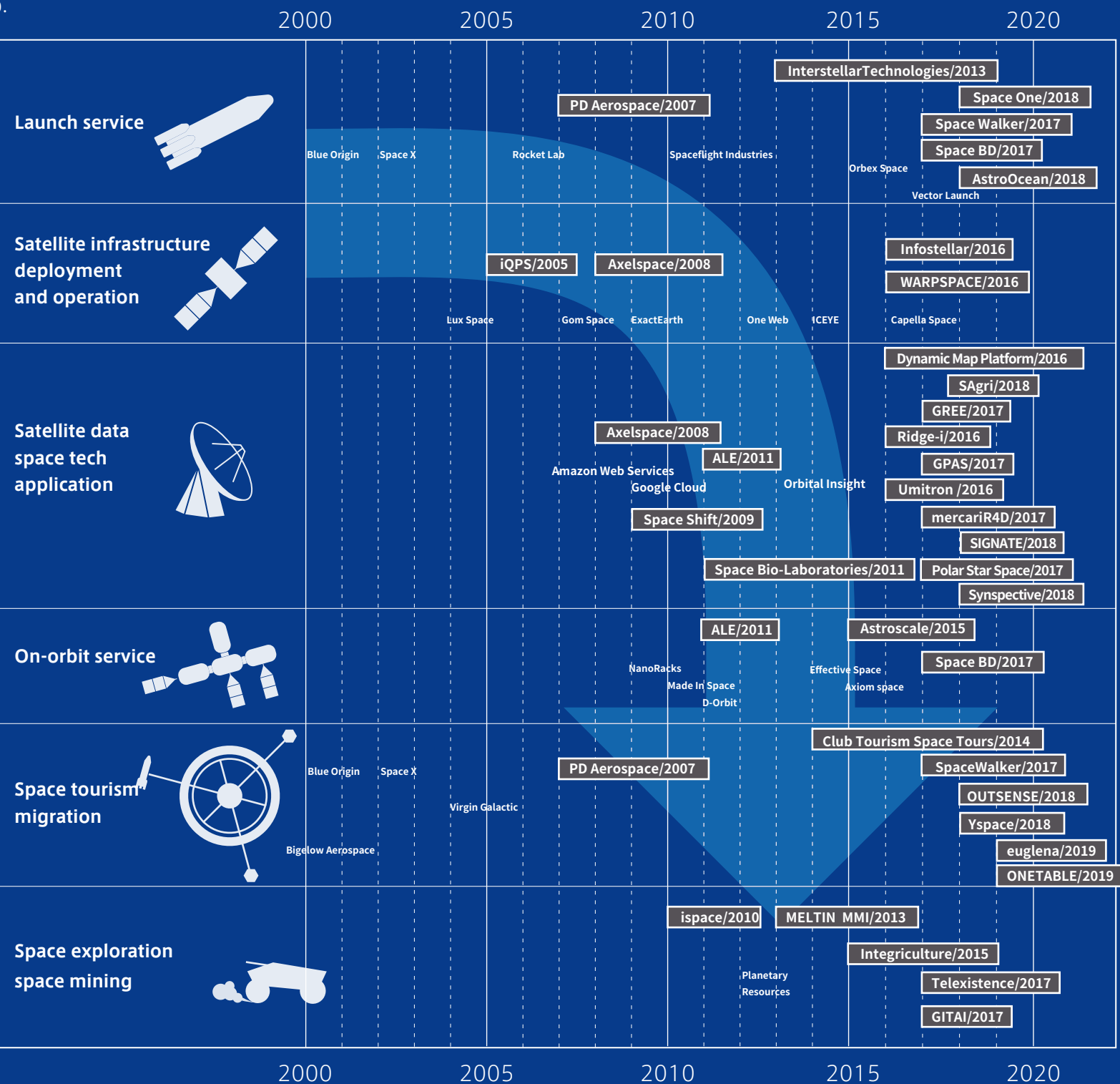
*1 : Definition of startup: companies established after 2000. (incorporated associations are excluded)

*2 : Only end product manufacturer (OEM) is listed

*3 : Alphabetical order

Player map by year founded

The development of launch service drove the growth of satellites data applications and related businesses.
New type of businesses such as space tourism and space mining has emerged



*1. Lowercase letters indicate foreign companies (only main players)

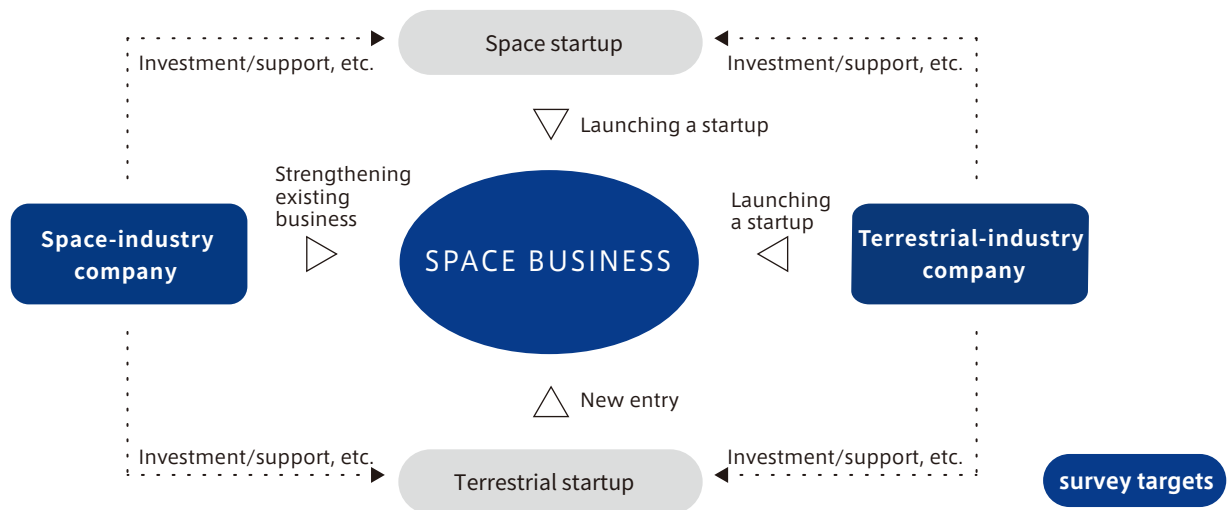
*2. Some abbreviation are used due to limited space

*3. Terrestrial startups are also listed in order of years since their establishment. However, GREE is listed by the year when it announced entry into the space business.

PLAYER MAP-Corporations

Space business activity trend by Corporations

In this section, we research trends of corporations(excluding start-up companies) working on new space business(*1)



We list the companies that meet the following conditions and research about the companies.

Conditions

- Investment to space startups
- Participation to following government agency programs

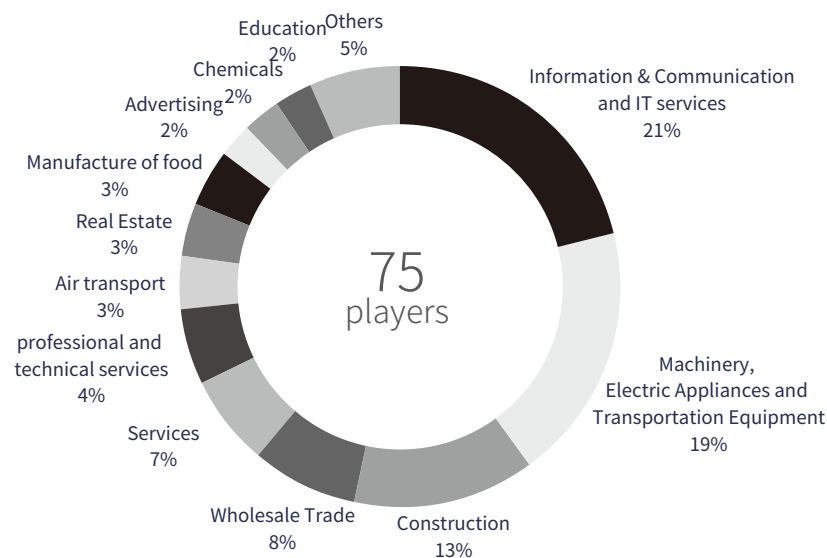
| |
|---------------|
| S-matching |
| S-Booster |
| XDataAlliance |
| J-SPARC |

However, following company types are excluded

- Companies specialized in investment and finance
- Overseas companies
- Startups

It can be seen that business companies in various industries participate in the space business.

Result

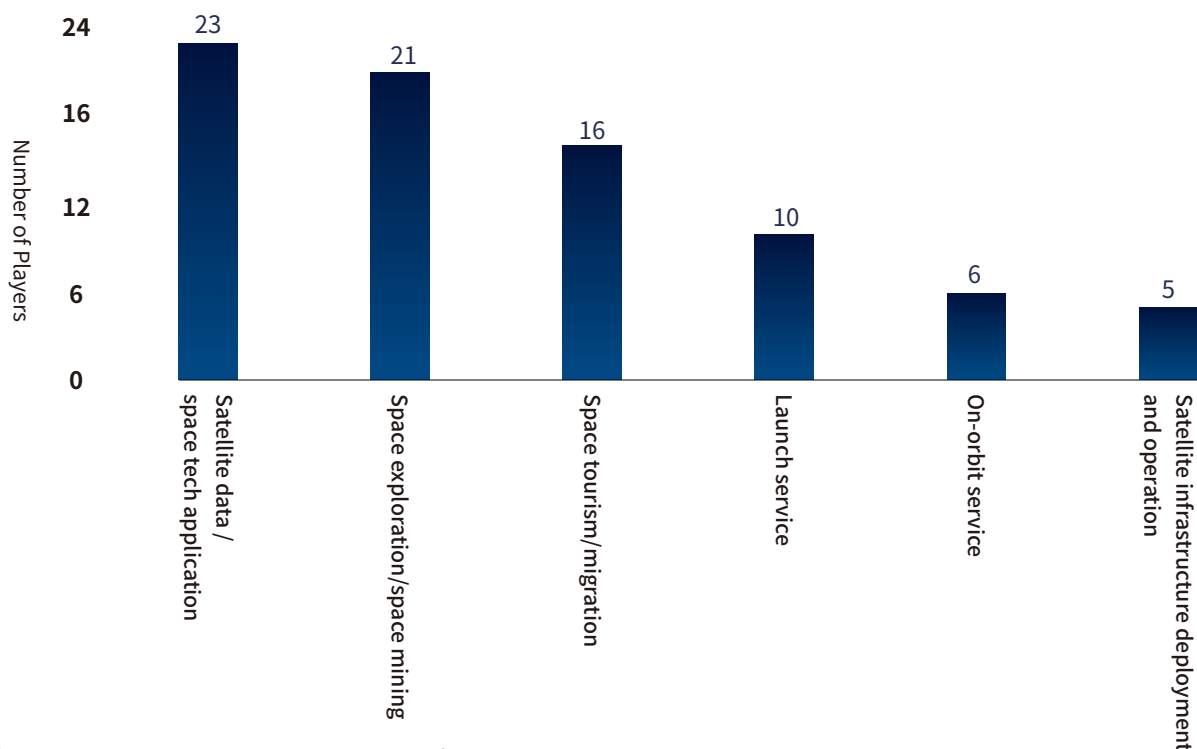


*1 : Definition: investment to space startups or participation to major space business promotion program by government agencies after 2018

*2 : Industry classification is categorised by SACPETIDE.

It refers to industry classification defined by Ministry of Internal Affairs and Communications and Securities Identification Code Committee.

In particular, non-space players are attracted towards "Satellite data / space tech application ", "Space exploration/space mining", and "Space tourism/migration" segments



Preference in entry segment varies by the type of industry

| | Satellite data / space tech application | Launch service | Satellite infrastructure deployment and operation | On-orbit service | Space tourism /migration | Space exploration/ space mining |
|---------------------|---|--|---|--|---|--|
| More than 2 players | <ul style="list-style-type: none"> IT services Machinery, electric and transport Wholesale Trade | <ul style="list-style-type: none"> Wholesale Trade Services | <ul style="list-style-type: none"> IT services | <ul style="list-style-type: none"> Machinery, electric and transport | <ul style="list-style-type: none"> Services Food Professional and technical services | <ul style="list-style-type: none"> Construction IT services Machinery, electric and transport |
| 1 Players | <ul style="list-style-type: none"> Advertising Insurance Printing Education Services Professional and technical services Air transport | <ul style="list-style-type: none"> Construction Air transport IT services Pulp and Paper | <ul style="list-style-type: none"> Machinery, electric and transport Advertising Insurance | <ul style="list-style-type: none"> Air transport Real Estate Services | <ul style="list-style-type: none"> Construction Air transport Real Estate Retail Trade Education Pulp and Paper | <ul style="list-style-type: none"> Services Air transport Real Estate Chemicals Other manufacturing |

*1 : Created based on public information. Companies with unknown business and investment details are excluded.

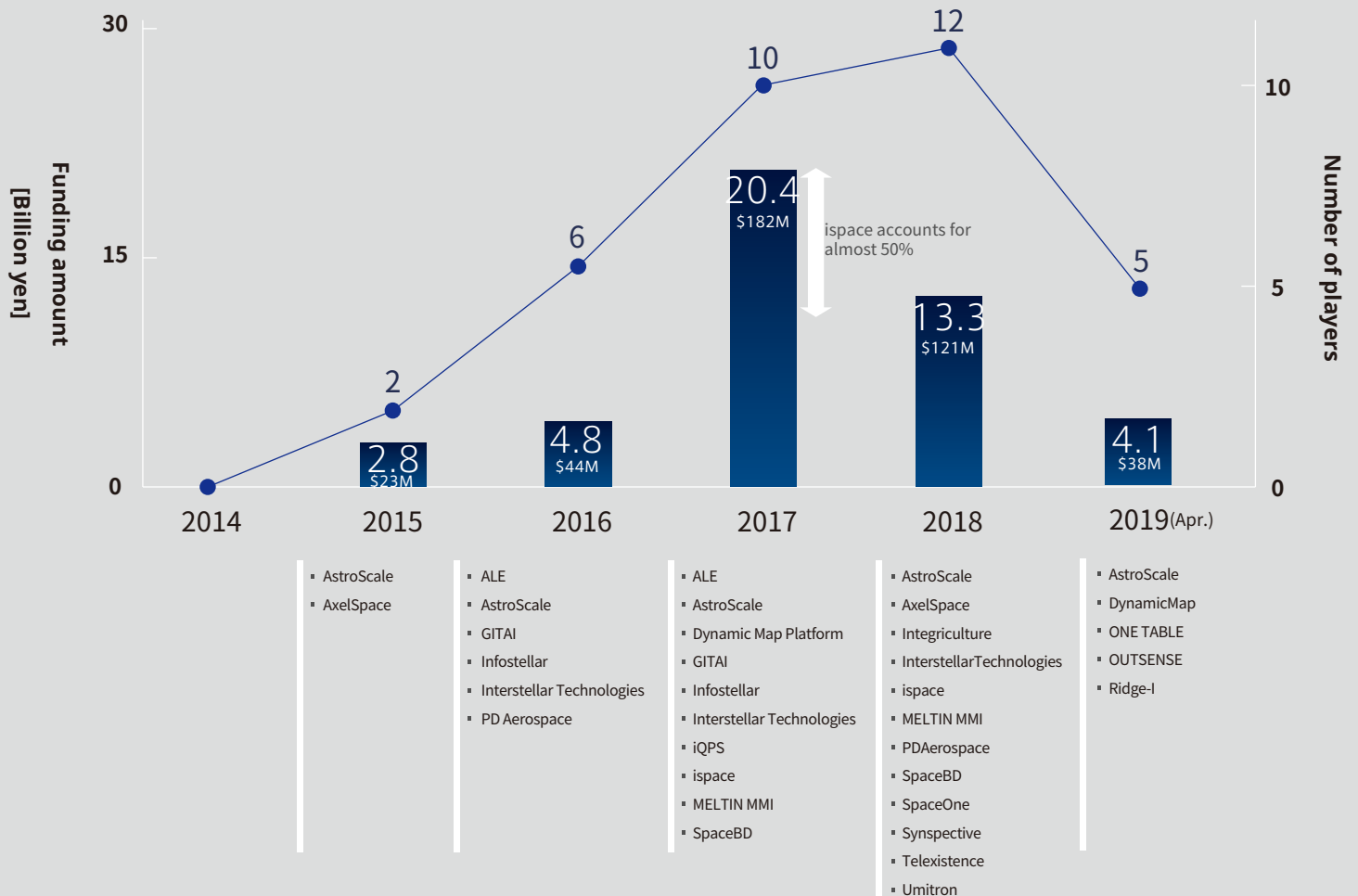
*2 : Companies that have invested are classified and counted in segments of investee companies.

*3 : Sum of companies in the graphs do not match the total number of companies, as companies may fall into multiple segments.

INVESTMENT

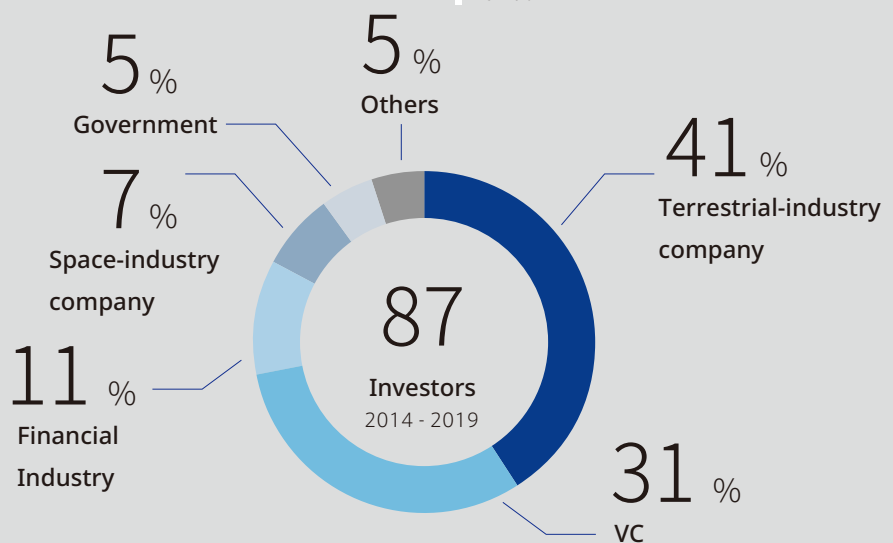
Raised capital by year (Startups in Japan)

Total funding is ¥13.3B in 2018, ¥+4B in 2019 as of April



Investor profile

The main investors in Japan are typically VCs and terrestrial corporations (incl. CVC)



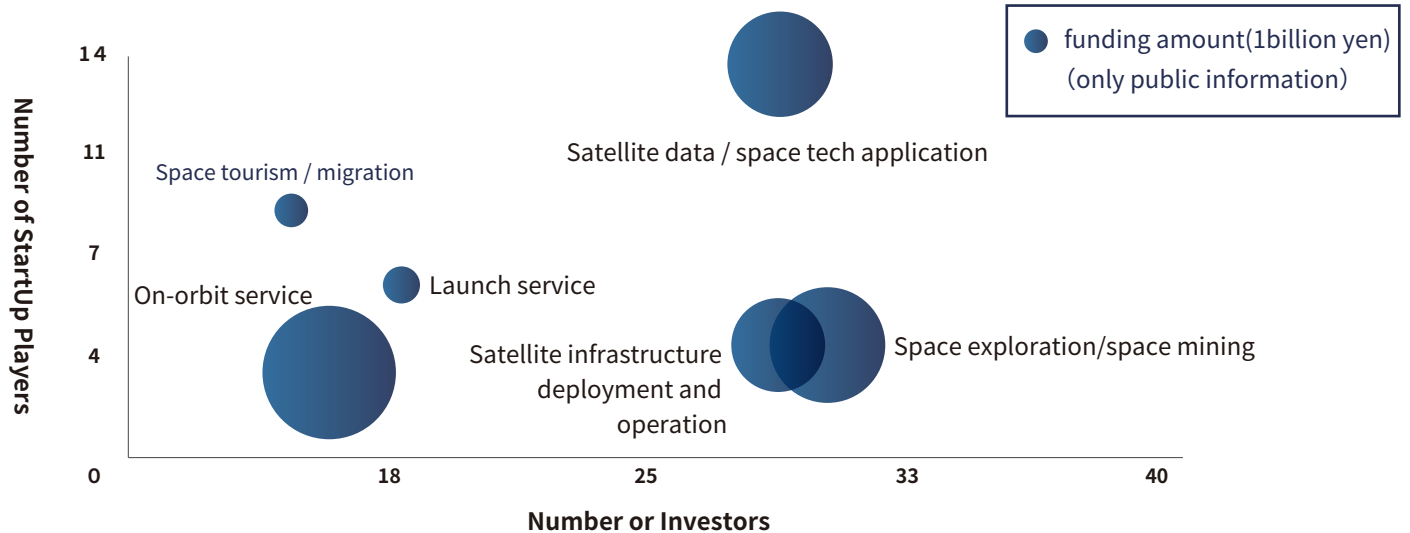
*1 : Based on public information released (only the number of startups are counted if the raised amount is not disclosed)

*2 : Raised capital is the total of domestic investment, alliance, sponsorship and crowdfunding

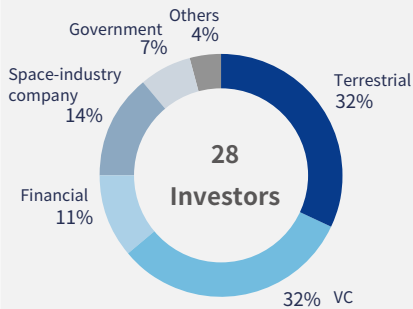
*3 : investor profile is based on total of invested players between 2014-2019 without overlap

*4 : "Terrestrial-Industry company" is companies excluded Space-Industry and financial and VC (categorized by SPACETIDE)

By segment, volume of investors, players and investments varies.

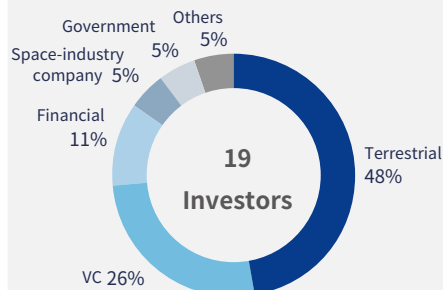


Satellite data / space tech application



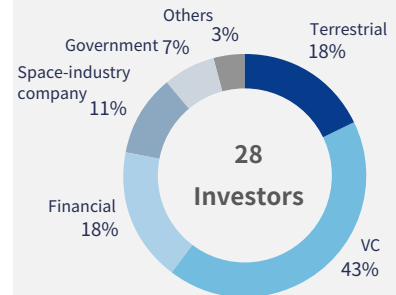
"Satellite data / space tech application" segment attracts most volume of investments from almost all fields. This segment contributes to expand the base of space business

Launch service



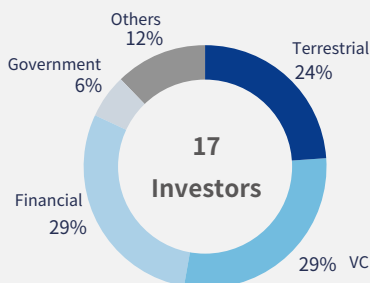
"launch service" segment attracts non-space player investments like "Space exploration/space mining" segment. They continue to attract attention from outside the space industry

Satellite infrastructure deployment and operation



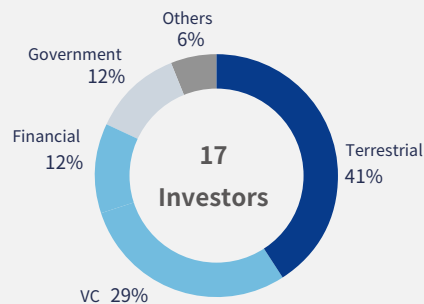
"Satellite infrastructure deployment and operation" segment attracts investments from VCs and financial players. Expectations as an investment case seems strong

On-orbit service



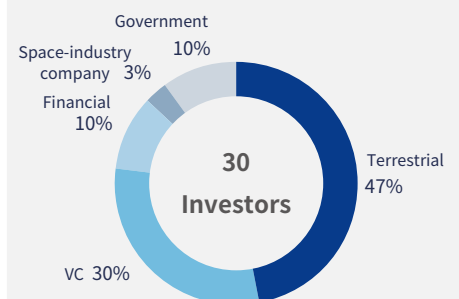
"On-orbit service" also attract investments from VC and financial players. Its potential as a business is growing

Space tourism / migration



This segment has the second largest number of start-up players in six segments. although the number of investors / the amount of investment is not large, the ratio of the investments from non-space players and VC is large

Space exploration/space mining



"Space exploration/space mining" segment attracts investments from non-space players

COMPASS

Satellite

applications

Satellite infrastructure

and operations

| Space

Space exploration



te data / space tech

ation | Launch service

structure deployment

ion | On-orbit service

e tourism / migration

oration / space mining



AFTER WORD

In the age of the rapid expansion of space business, what types of new players are entering space industry? COMPASS Vol. 1 conducted a research to answer the question, in addition to provide updates from Vol. 0.

As a result, companies newly engaged in the space business have spread to a wide variety of industries, and the data validates the expansion of the space business that we have been experiencing.

In addition, the contents of this issue include a breakdown of funding sources (numbers), hot topics of space business. Our hope is to continue to analyze relevant topics of space business from various angles

SPACETIDE launched its own research report in late 2018, SPACETIDE COMPASS, to deliver and summarize the progress and trends of the entire space business to wide audience.

And now we are pleased to be able to deliver a second research report in conjunction with the annual conference SPACETIDE 2019.

In this report, new analysis is provided in addition to the previous updates.

SPACETIDE will continue to carry out various activities that can contribute to the development and expansion of new space businesses

COMPASS Vol.1

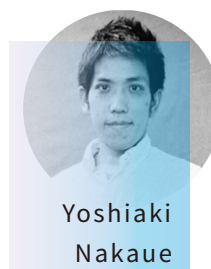
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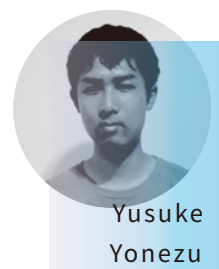
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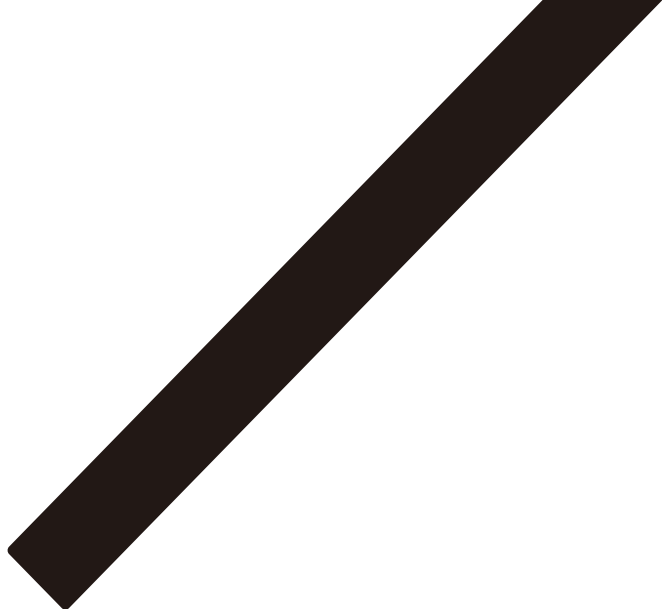
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