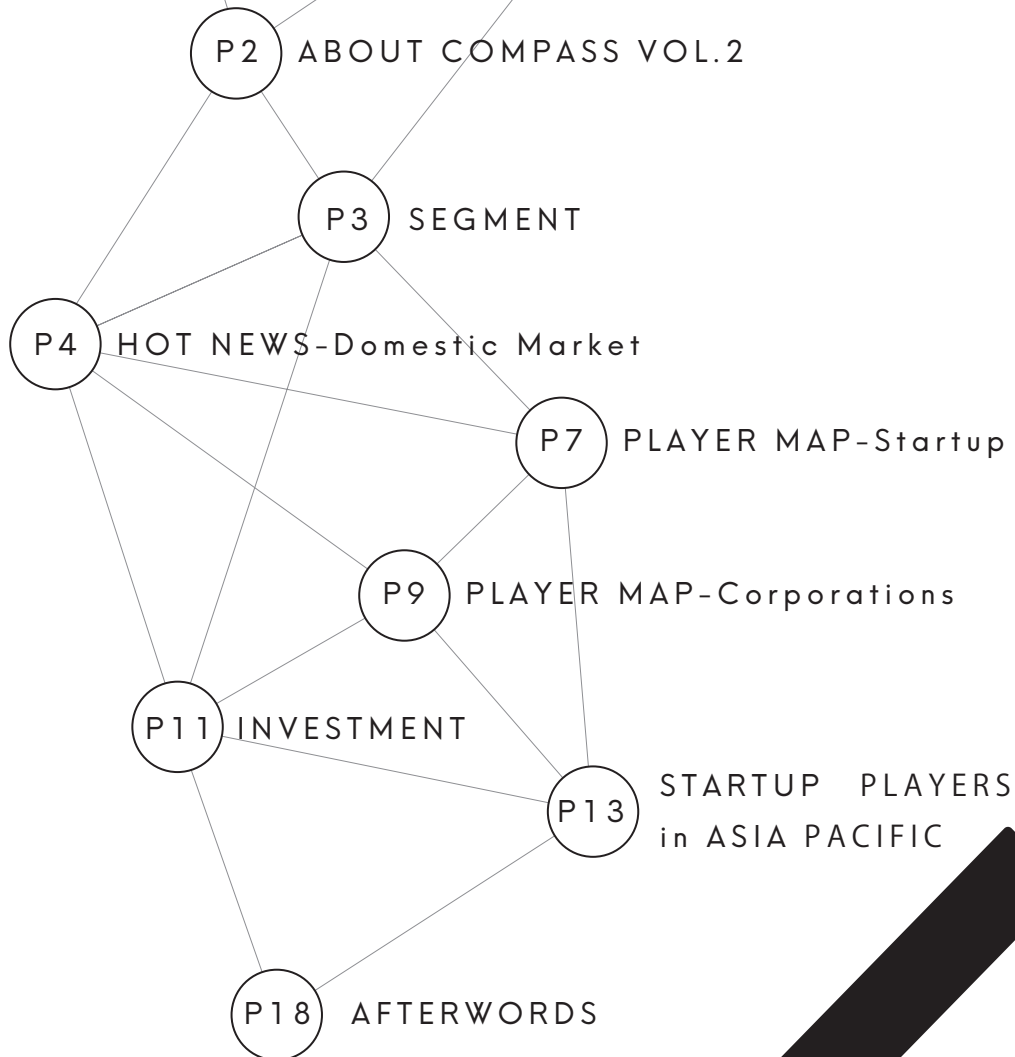


COM PASS

vol.2



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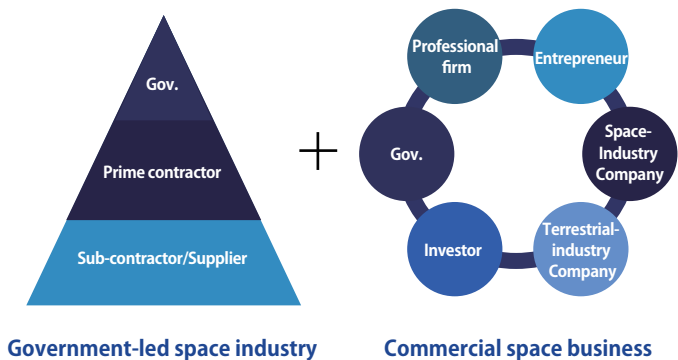


COMPASS

SPACETIDE COMPASS vol.2

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 Vol.0 was published as the first issue in December 2018 with Vol.1 following in July 2019. Each publication has been viewed, referenced and utilised by a wide range of audiences within the space industry including government agencies (e.g. JAXA), non space-related companies, private researchers and academia etc...

Encouraged by the response and support COMPASS has received, we are proud to introduce SPACETIDE COMPASS Vol. 2. Now, approximately one year after the first issue of this publication, we have conducted research not only on Japanese startup players, but also commercial movement in the Asia-Pacific region.

In addition, we present market size forecasts for each segment which is defined by SPACETIDE.

We hope that you enjoy reading COMPASS Vol.2, and please feel free to contact us should you have any further comments, thoughts or subsequent requests.

*1: As of Dec 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

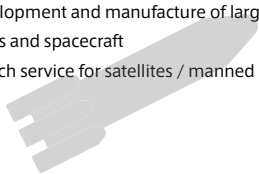
- Satellite data distribution
- Satellite data solution services, using analyzed / processed satellite data
- Satellite communication service



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

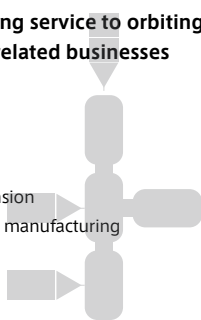
- Development/manufacture of geostationary satellites
- Development/manufacture/deployment for low/medium earth-orbit satellites
- Ground facilities and terminal



On-orbit service

Business providing service to orbiting artifacts and its related businesses

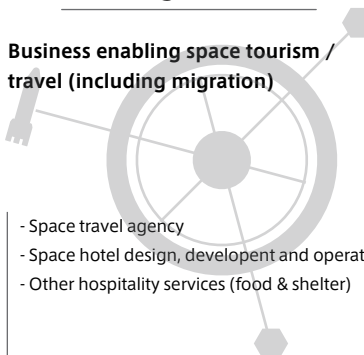
- Satellite life extension
- In space R&D and manufacturing
- Debris removal



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

HOT
NEWS

A variety of services and business activities utilizing satellite data have been announced. And more updates on these activities are expected.

- The number of the users of "Tellus", a satellite data platform has been increasing together with the number of corporate partners (e.g. NTT East) and the kinds of satellite data.
- In November 2019, Bascule, SKY Perfect JSAT and JAXA announced they would be opening a studio on the International Space Station (ISS) to start the "Space Media Business" within JAXA's space business innovation partnership scheme "J-SPARC."



MARKET

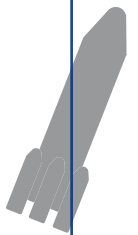
The market size of space utilizing segment in Japan is currently ~800 billion yen; with some reports estimating it will reach nearly 2 trillion yen in the 2030s. (Do not include ripple effects)
(Ministry of Internal Affairs and Communications, documents of taskforce, 2019)

Launch service

HOT
NEWS

Progress has been made on the launch and development of rockets by several Japanese startups.

- In November 2019, SpaceOne held a ceremony to mark the start of construction of a rocket launch site in Kushimoto Town, Wakayama Prefecture. Completion is scheduled to be in the summer of 2021, with the aim of having the first rocket launch from the site by March 2022.
- In May 2019, Interstellar Technologies launched a rocket (to an altitude of 13.3 km). And, In July 2019, they raised more than 1.2 billion yen to aid acceleration in development of such technology.
- In December 2019, Space BD was selected by JAXA as the service provider in the microsatellite launch business employing H-IIA / H3 launch vehicle via ride-share capacity



MARKET

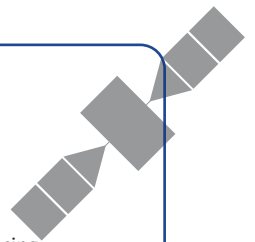
The market size in space transportation segment in Japan is currently ~130 billion yen, with it being estimated to reach ~360 billion yen in the 2050s.
(Ministry of Internal Affairs and Communications, documents of taskforce, 2019)

Satellite infrastructure deployment and operation

HOT
NEWS

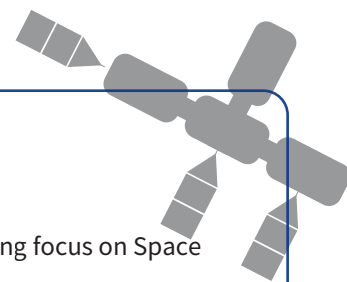
Japanese startup players successfully launched satellites in 2019. On top of that, some relevant investments have been very active recently.

- In December 2019, iQPS Inc. launched a small SAR satellite "Izanagi" on an Indian launch vehicle, announcing successful orbit insertion and communication



MARKET

The market size in this segment in Japan is currently ~180 billion yen, with it being estimated to reach ~1.4 trillion yen in the 2050s.
(Ministry of Internal Affairs and Communications, documents of taskforce, 2019)



On-orbit service

HOT
NEWS

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

The Japanese government has announced that they will have an increasing focus on Space Situational Awareness (SSA).

- In 2019, ALE and Astroscale, both of which are working on space debris removal solutions, raised funds to accelerate technology and business development
- In December 2019, the Japanese government's Space Plan (Revised Draft) indicated that operation of the SSA system in FY23 will begin, with a 2026 target launch date for the SSA satellite

MARKET

Current market size of new space business is unknown due to the emerging nature of this segment in Japan.

Various forecasts estimate that the cumulative revenue up to 2028 will exceed 450 billion yen.

(Space Tech Partners, OOS/ADR Market Highlights, 2019, / NSR(Northern Sky Report), 2019)

Space tourism/migration

HOT
NEWS

The program which aimed at solving food issues have announced long-term scenarios.

- In August 2019, "Space Food X," which aims to solve issues related to food production and supply in space and on the Earth and to accelerate to establish a full-scale market in this sector, announced "Scenario 1.0" a long-term strategy for 2050.

2030: Contribution to achieving the SDGs target

2040: 1,000 inhabitants on the Moon

2050: Construction / expansion of human survival bases (space and terrestrial) for avoiding threats to human survival and for further development of such an economy

MARKET

Current market size is unknown due to the emerging nature of this segment in Japan.

Various forecasts expect the market size to reach 110-300 million yen in the next decade.(Does not include point-to-point travel)

(Bryce Space and Technology, 2018/UBS Investing Insights, 2019)

Space exploration/ space mining

HOT
NEWS

Progress has been made in both the public and private sectors. Startups are successfully raising meaningful investments, and the Japanese government have announced participation in several international space exploration programs.

- In August 2019, ispace announced its target milestones for their lunar exploration program with the aim to achieving a landing in 2021 and lunar exploration in 2023. In parallel, they have announced funding from several sponsors.
- In October 2019, the Japanese Government announced its policy to participate in an international space exploration program called 'Gateway', in conjunction with the United States.

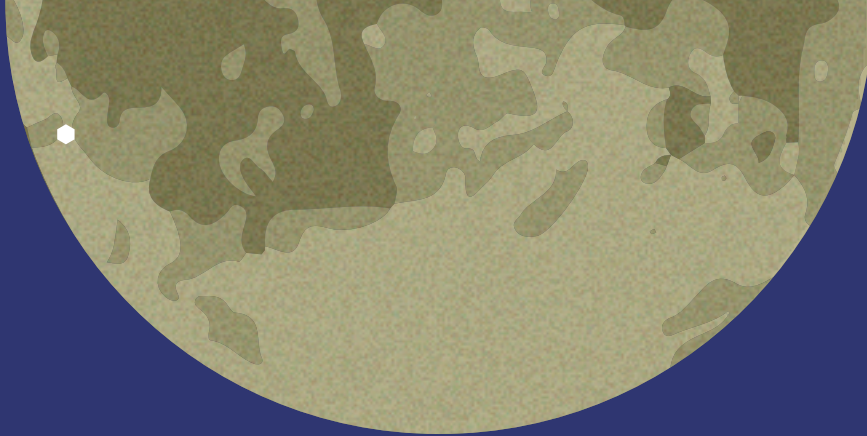
MARKET

Current market size is unknown due to the emerging nature of this segment in Japan.

In globally, it is predicted that there will be a market value of more than \$ 6.3 billion in 2040.

(London Economics analysis,2014)





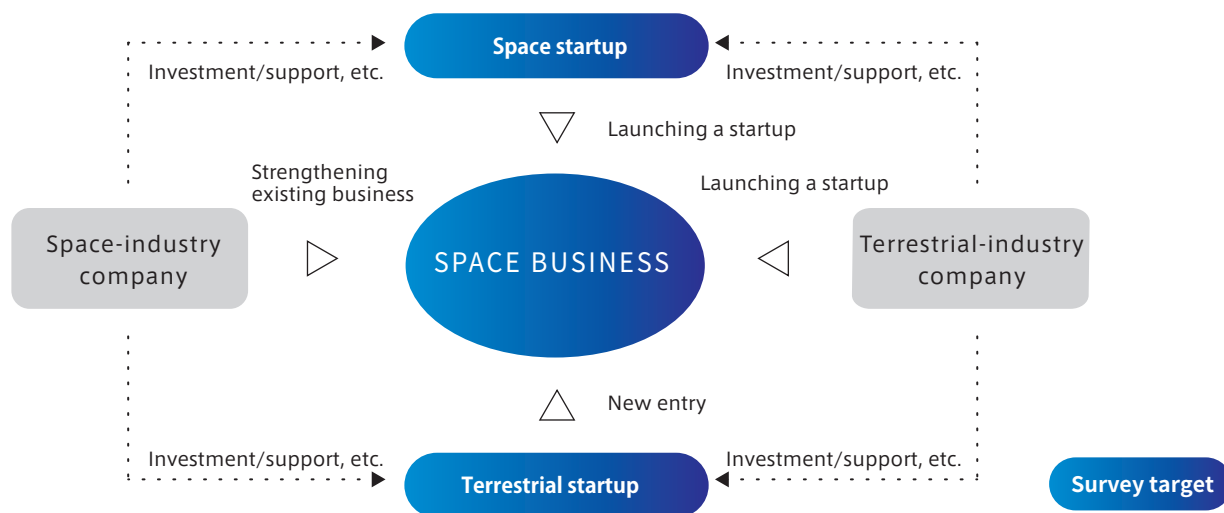
more players
more visions



Space business entry approach and research scope

Launching a startup, developing a new business and investing/advising ...

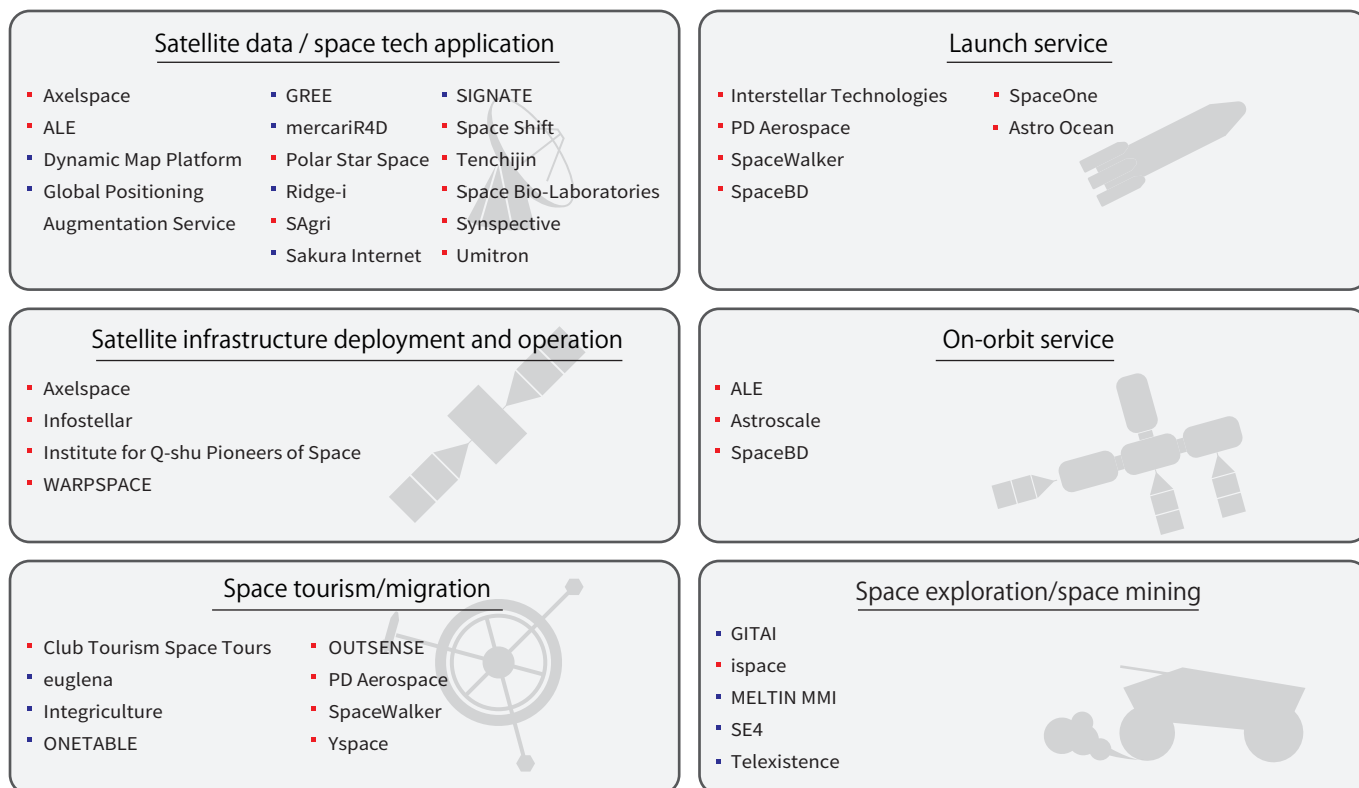
There are many approaches to enter the space business. Research scope in this section is Japanese startups established after 2000.



Player map by business segment

Various startups are emerging in each segment

- Space startup
- Terrestrial startup



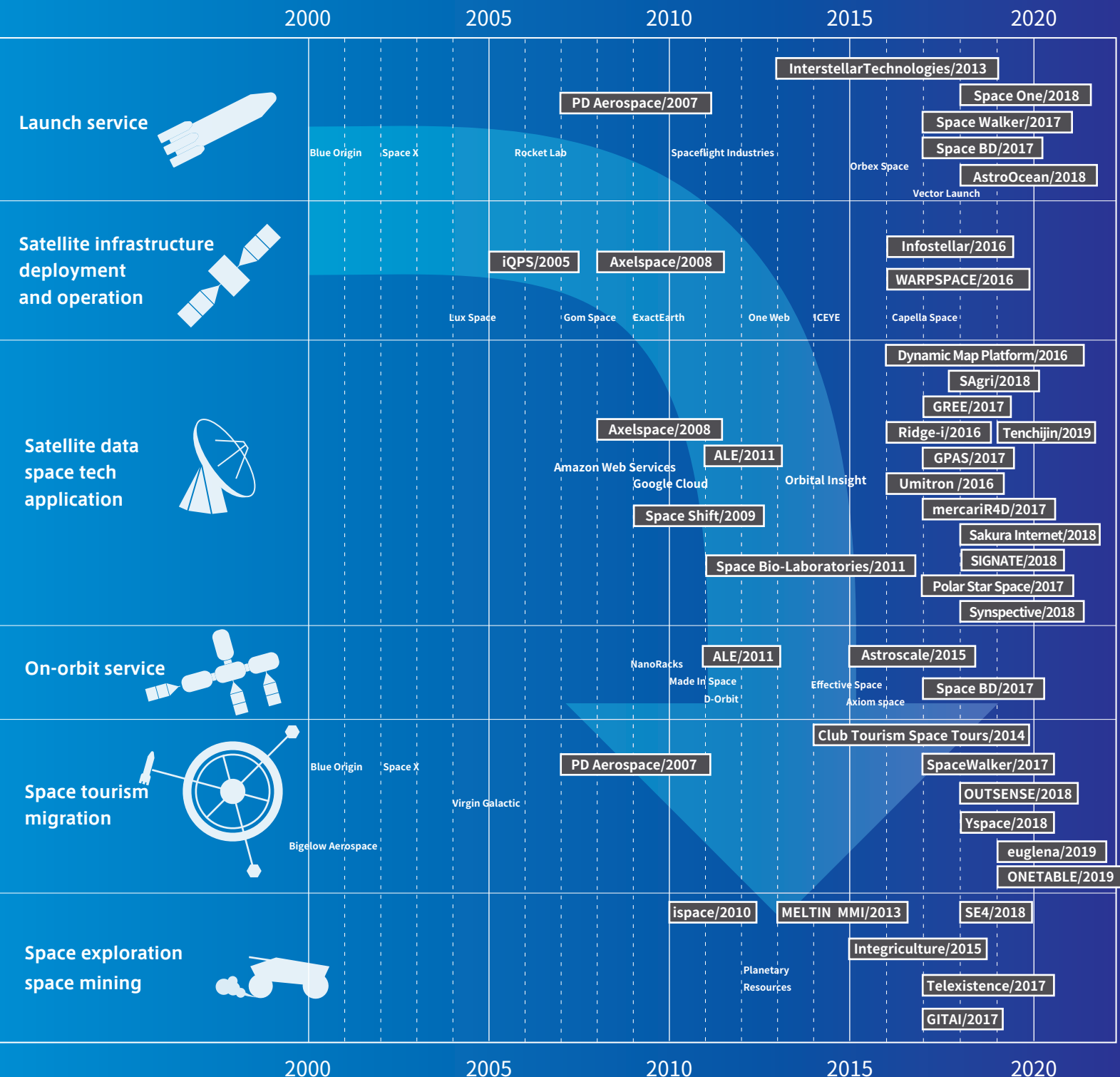
*1 : Definition of startup: companies established after 2000. (incorporated associations are excluded)

*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)

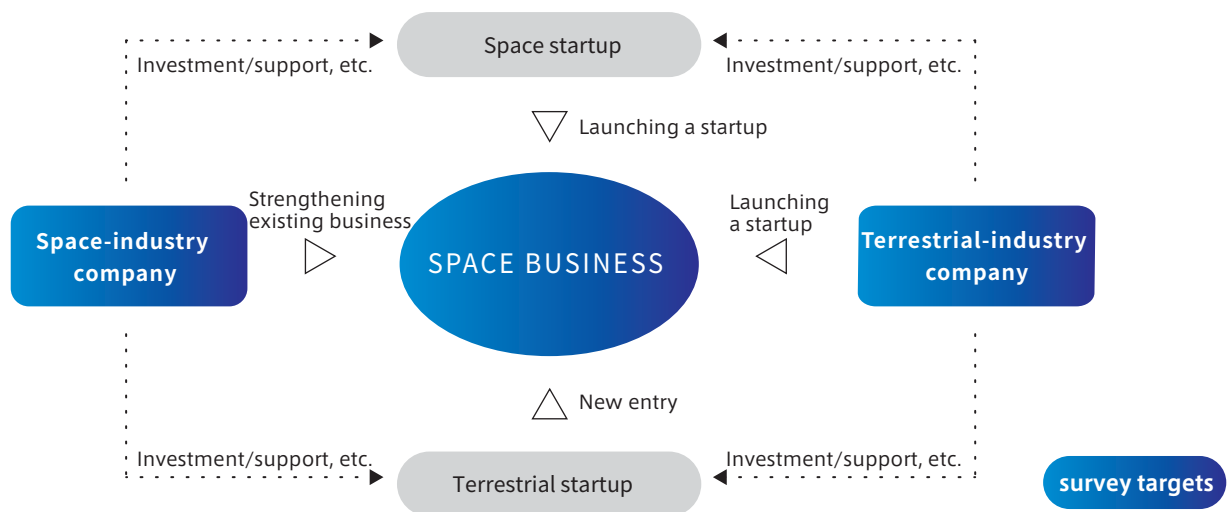
*2. Some abbreviation are used due to limited space

*3. Terrestrial startups are also listed in order of years since their establishment. However, GREE, Sakura etc are 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)



In Japan, Approx. 84 companies have participated in major space business promotion programs organized by the Japanese government agencies since 2018. At the time of the previous survey for COMPASS Vol.1, this statistic was ~75 companies, and the majority of players predominantly engaged in "Satellite data / space tech applications"; the number of players in the "Space tourism/migration" and "space tech application" has increased.

Conditions

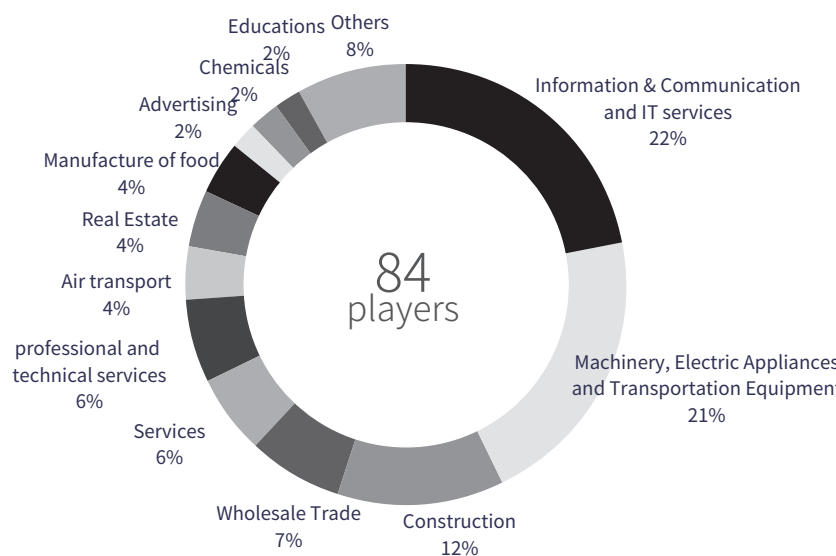
- Investment to space startups
- Participation to following government agency programs

S-matching
S-Booster
XDataAlliance
J-SPARC

However, following company types are excluded

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

Result

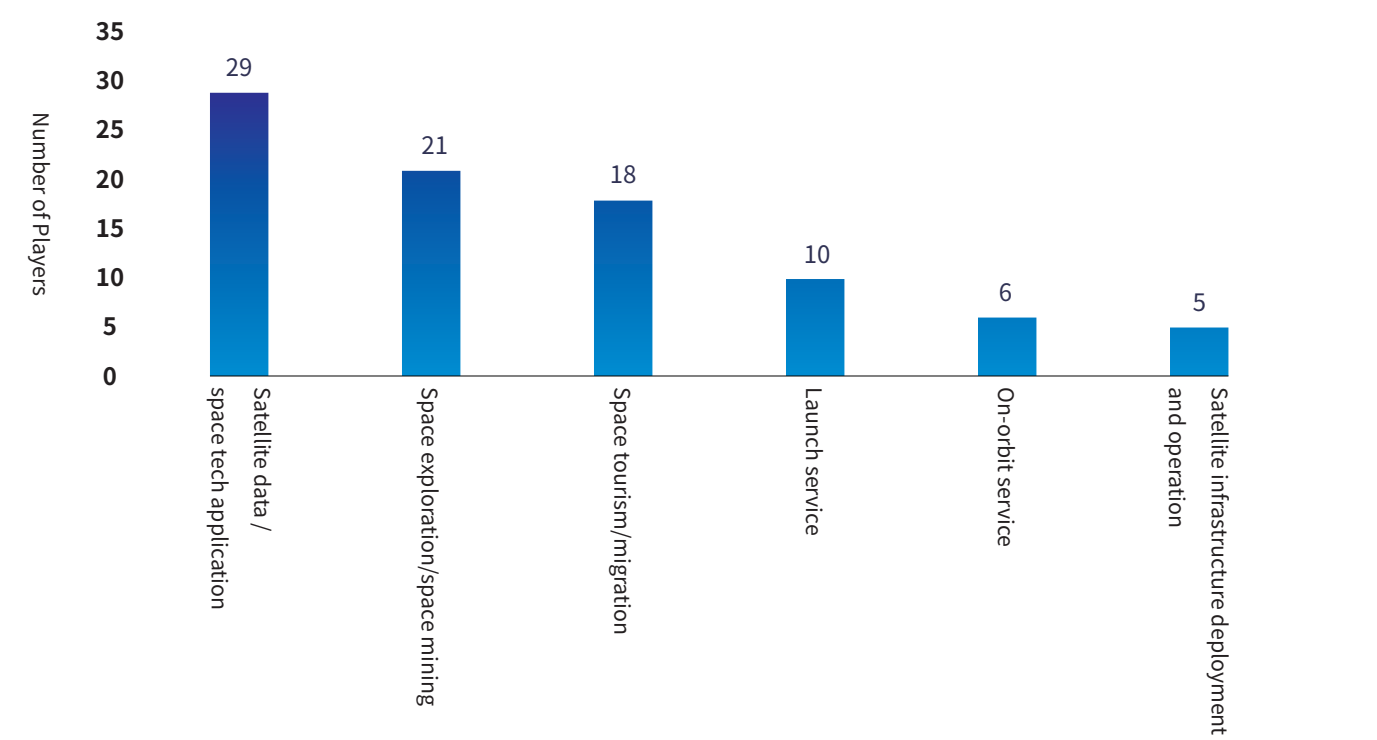


*1 : Definition: investment to space startups or participation to major space business promotion program by government agencies after 2018

*2 : Industry classification is categorised by SACPETIDE.

It referred 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

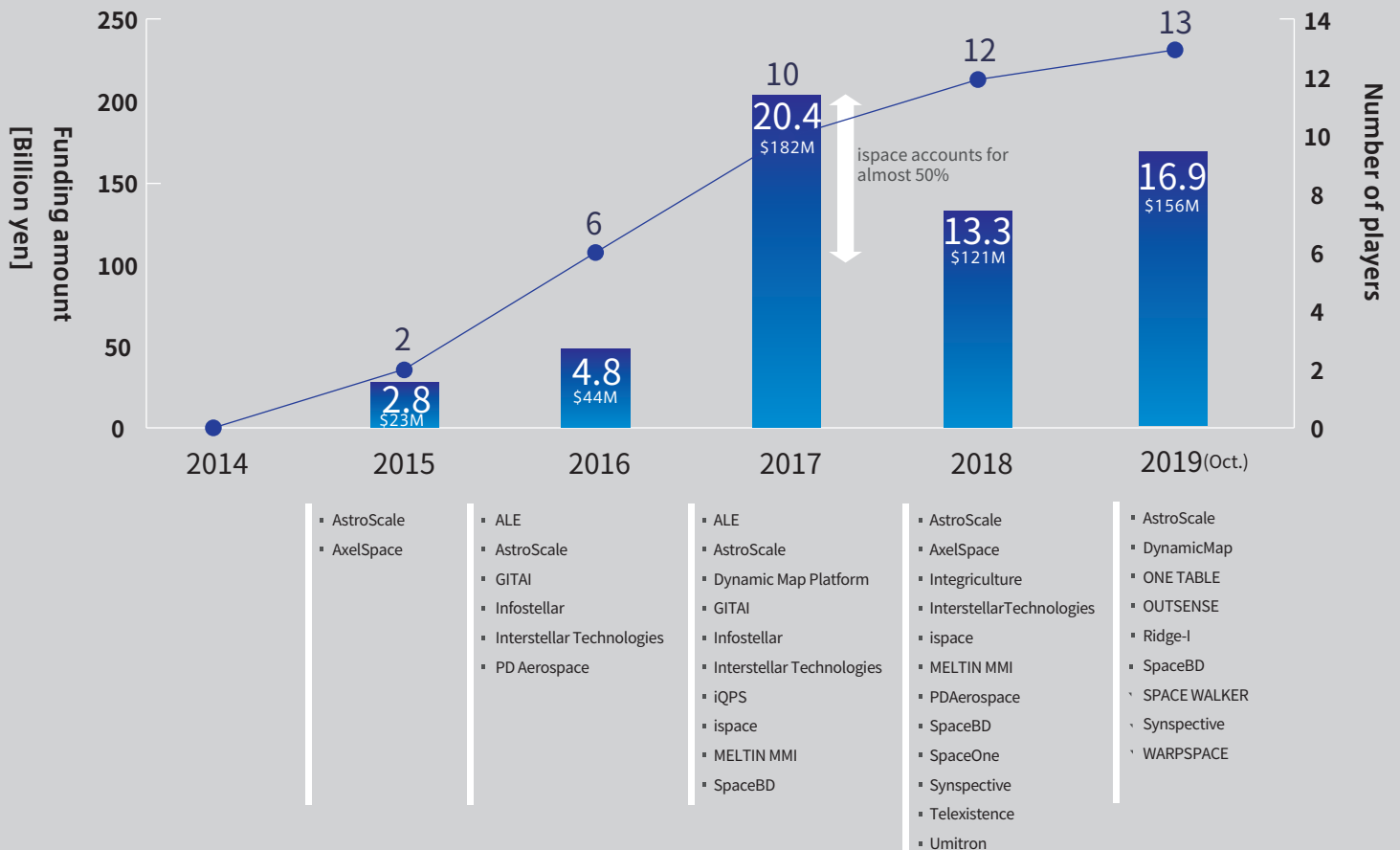
	Satellite data / space tech application	Launch service	Satellite infrastructure deployment and operation	On-orbit service	Space tourism /migration	Space exploration/ space mining
More than 2 players	<ul style="list-style-type: none"> IT services Machinery, electric and transport Wholesale Trade Professional and technical services 	<ul style="list-style-type: none"> Wholesale Trade Services Machinery, electric and 	<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 Player	<ul style="list-style-type: none"> Advertising Insurance Printing Education Services Air transport non-ferrous metals 	<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 Fabricated metals 	<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

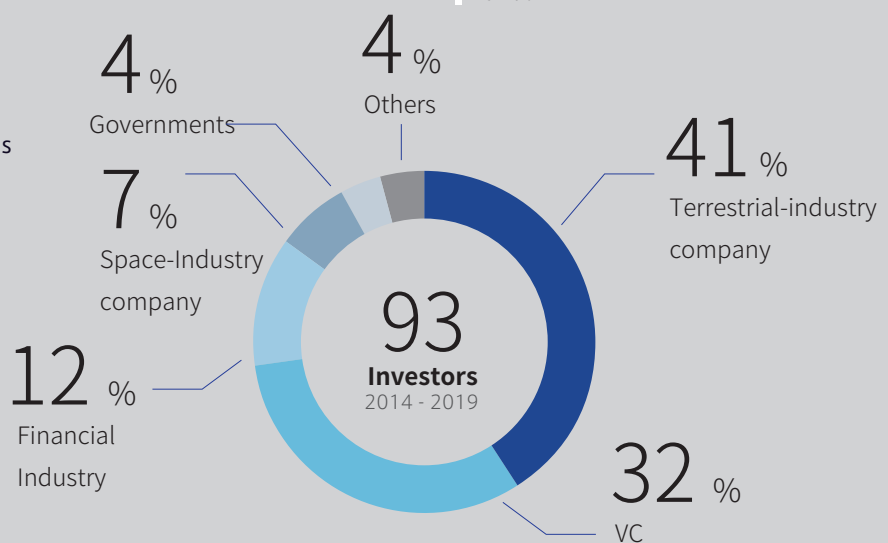
Raised capital by year (Startups in Japan)

Total funding Japanese space startups raised in 2018 was 13.3 billion yen, with 2019 funding until October reaching over 16 billion yen



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)

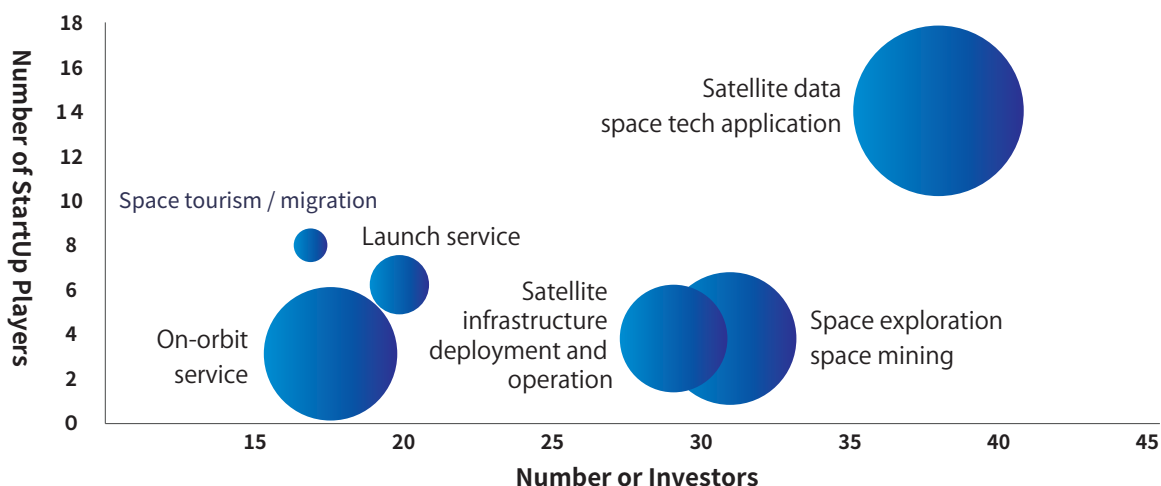
*2 : Raised capital is the total of domestic investment, alliance, sponsorship and crowdfunding

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

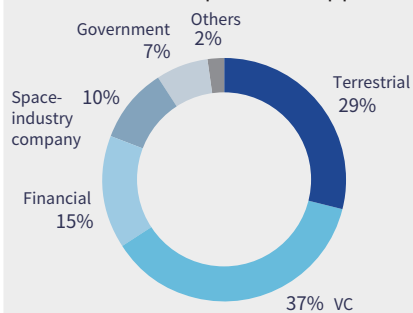
*4 : "Terrestrial-Industry company" is companies excludd Space-Industry and financial and VC (categorized by SPACETIDE)

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

● funding amount(1billion yen)
(only public information)

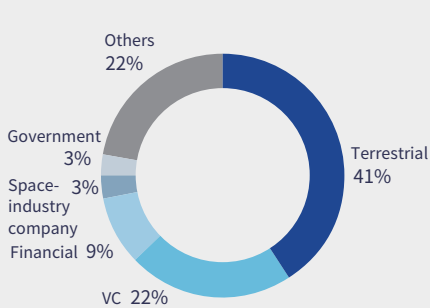


Satellite data / space tech application



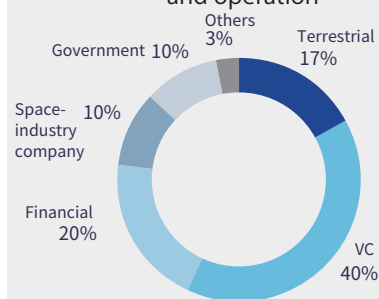
In this segment, the corporates received the largest amount of funding in 2019 - with most companies raising funds in the second half of 2019. It is a feature that the percentage of financial / VC investments increased.

Launch service



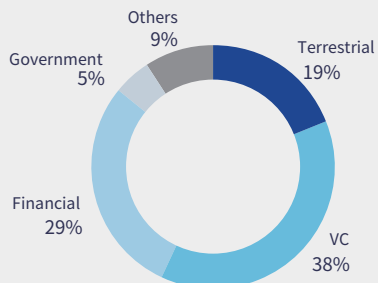
In this segment, two companies raised funds in the second half of 2019. In particular, the funding into the "Other" category has increased significantly due to financing from multiple individual investors. Furthermore, the number of investments from VCs continues to be relatively small.

Satellite infrastructure deployment and operation



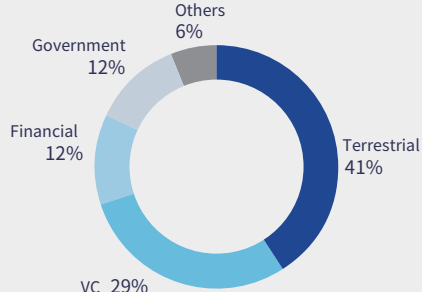
In this segment, investments from financial industry exceeded those from non space related industry due to a slight increase in the number of investments from finance institutions during the first half of 2019. This segment continues to be characterized by having the largest number of investments from VCs.

On-orbit service



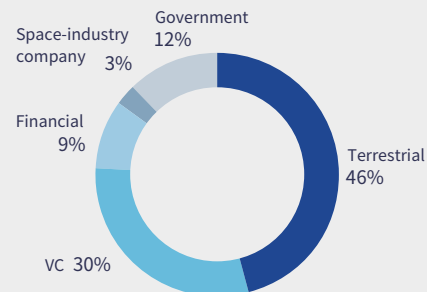
In this segment, one company has raised funds in the second half of 2019. Although there is no significant change in the proportion of investors by segment, total amount of the funds raised is large, indicating that investors are paying attention to the segment.

Space tourism / migration



There are no new investments in the second half of 2019 in this segment likely due to the large volume of investments in the second half of 2018 and the first half of 2019. However, since this is an area comprised with a large proportion of startup players, near-future investments are likely.

Space exploration/space mining



In this segment, one company raised funds, and the number of investments sourced from the Japanese government exceeded that from financial institutions. As in the first half of 2019, investments from cross-sectorial industry and VCs accounted for over 70% of total investment into the segment



STARTUP PLAYERS in ASIA PACIFIC

There are various space startups
in Asia-Pacific.
COMPASS Vol.2 covers
the Singapore, Thailand and Australia.



3
players

Thailand

- Astroberry
- Mu space
- Space Zab



10
players

Singapore

- Alenia
- Infinite Orbits
- Kacific
- Microspace
- NuSpace
- Spacechain
- SpeQtral
- THISS Technologies
- Transcelestial technologies
- Wizlogix



18
players

Australia

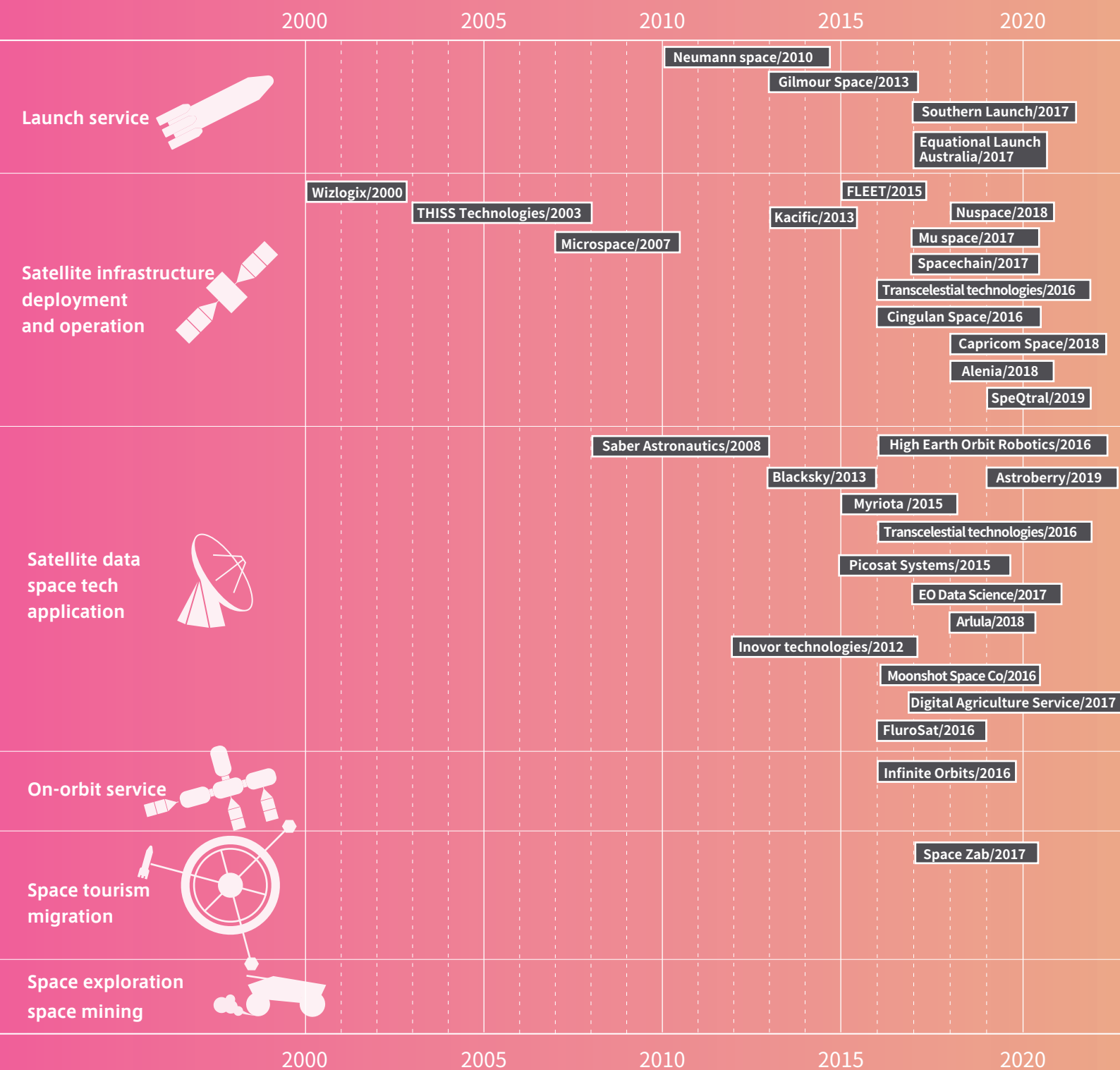
- Arlula
- Blacksky
- Capricorn Space
- Cingulan Space
- Digital Agriculture Service
- EO Data Science
- Equatorial Launch Australia
- Fleet Space Technologies
- FluroSat
- Gilmour space
- High Earth Orbit Robotics
- Inovor technologies
- Moonshot Space Co
- Myriota
- Neumann space
- Picosat Systems
- Saber Astronautics
- Southern Launch

STARTUP PLAYERS in ASIA PACIFIC^β

Players in Asia-Pacific






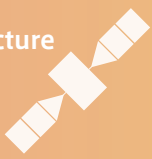

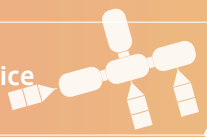


In the aforementioned APAC countries this volume focuses on, the number of players has soared since 2015.

In recent years, the space industry has been expanding significantly not only in Japan and China, but also in other countries in Asia-Pacific.



*1. By investigating the companies participating in space-related conferences and interviewing some professionals in the countries covered, we have long-listed the space startups which were founded after 2000.

At present, there are many players in the fields related to "Satellite data / space tech application " and "Satellite infrastructure deployment and operation" segments in Asia-Pacific.
The number of players in the other segments are somewhat less than in the Japanese space landscape.

	 Thailand	 Singapore	 Australia	 The Number of Japanese Players
Launch service 	UNCONFIRMED		Equational Launch Australia/2017 Gilmour Space/2013 Neumann space/2010 Southern Launch/2017	6 players
Satellite infrastructure deployment and operation 	Mu space/2017	Alenia/2018 Kacific/2013 Microspace/2007 Nuspace/2018 Spacechain/2017 SpeQtral/2019 THISS Technologies/2003 Transcelestial technologies /2016 Wizlogix/2000	Capricorn Space/2018 Cingulan Space/2016 FLEET/2015	4 players
Satellite data space tech application 	Astroberry/2019	Transcelestial technologies /2016	Arlula/2018 Blacksky/2013 Digital Agriculture Service /2017 EO Data Science/2017 FluroSat/2016 High Earth Orbit Robotics /2016 Inovor technologies/2012 Moonshot Space Co/2016 Myriota /2015 Picosat Systems/2015 Saber Astronautics/2008	16 players
On-orbit service 	UNCONFIRMED	Infinite Orbits/2016	UNCONFIRMED	3 players
Space tourism migration 	Space Zab/2017	UNCONFIRMED		8 players
Space exploration space mining 		UNCONFIRMED		5 players



AFTER WORD

COMPASS is linked to the activities of SPACETIDE and we are continuously expanding the range of content covered.

In this issue, we conducted research on space start-up players in the Asia-Pacific region, as SPACETIDE looks to expand into Asia-Pacific.

In addition, in response to feedback received, we conducted market size-related research for each segment. If you hold any opinions or ideas for COMPASS, sharing these with us would be much appreciated. Thank you for reading COMPASS, which will continue to evolve in Vol.3 and beyond.

SPACETIDE has launched our own space industry report “SPACETIDE COMPASS” at the end of 2018 with the aim of delivering the exciting information regarding the progress and trend of space industry as a whole.

We used to cover just Japan as the scope of the survey, but we have begun to start covering Asia-Pacific as well from Vol.2. Asia-Pacific area is the emerging driver in the global space industry with the number of space agencies and companies increasing steadily.

We are going to deliver some of the hottest trend of space-related business both in Japan and the world.

COMPASS Vol.2

Edit&Research

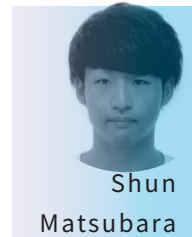
Hirokazu Mori, Jenna Tiwana, Misato Tsuji, Shun Matsubara, Toshihiro Obata, Yoshiaki Nakaue, Yusuke Nakada, Yusuke Yonezu, Masayasu Ishida, Masashi Sato

Design

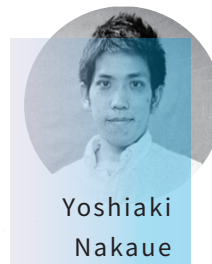
Kei Arima

SPACETIDE COMPASS vol2

Manager



SPACETIDE COMPASS Program Manager



SPACETIDE Foundation Chairman & CEO



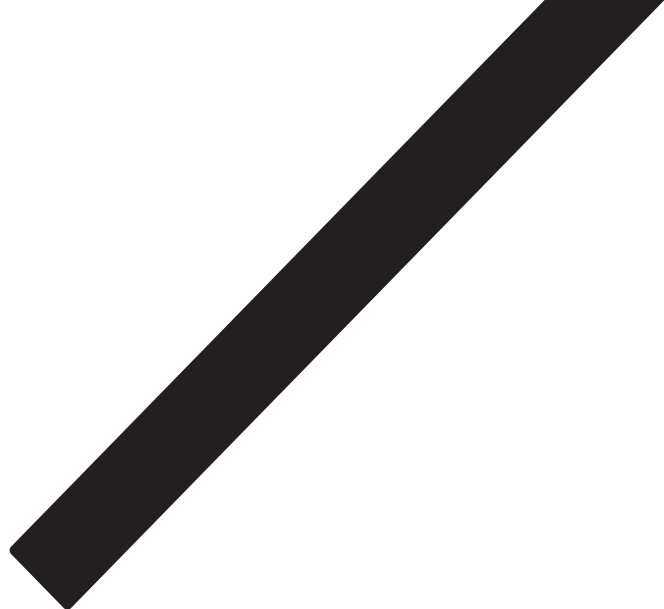
SPACETIDE

Publish: SPACETIDE Foundation

Date / 2020.1.20

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