Main trends and challenges in the space sector

June 2019

pwc.fr/space

PwC's dedicated space practice with leading edge insights and global reach

PwC Space practice and Strategy& - Who are we?

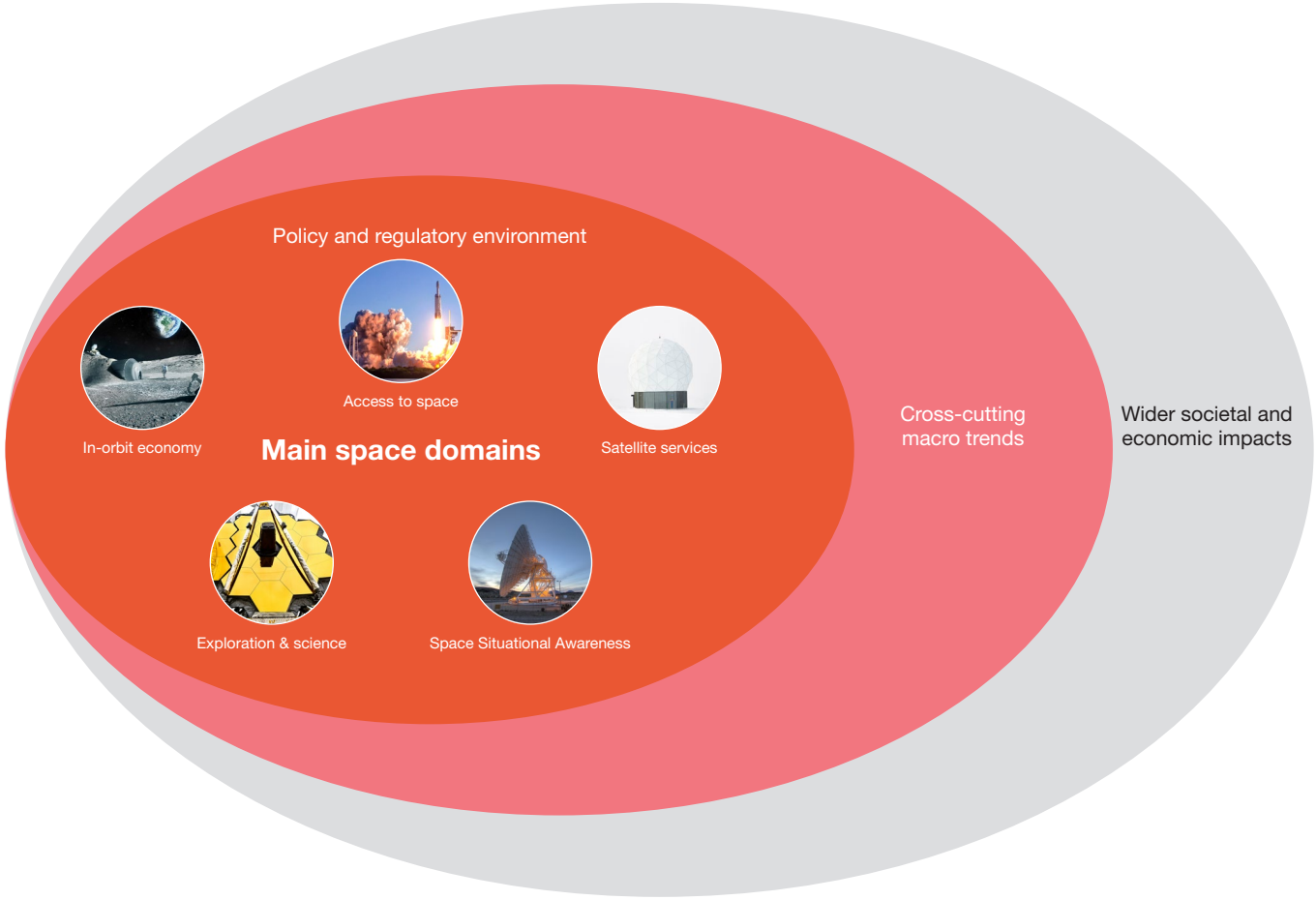
- The PwC Space Practice, with its global reach and a dedicated core consulting team based in Paris, is unique among large professional services firms
- Supported the European Commission and the European Space Agency for the last 10 years
- Working with the industry and with other space agencies in Europe and worldwide.
- Active in space data exploitation for business purposes, offering technical capacity building to non-space companies, and pioneering the use of space data to do business consulting
- The PwC Space Practice operates in the wider PwC and Strategy& Aerospace and Defence network, with more than 2000 professionals worldwide

strategy&

Part of the PwC network

The space sector is diverse, and driven by complex dynamics that go beyond simple market forces

Introduction



A diverse sector with multiple specificities

- Multiple domains with different trends and specificities
- An ever evolving regulatory and policy environment
- A significant reach and implications into other industrial sector, with subsequent dependency on general macro-trends
- Considerable wider societal and economic impacts, justifying the still prevalent government spending in the sector

Space is experiencing revenue and mindshare growth, as well as increasing implications in multiple downstream industries

Introduction

Figure 1: 2016 Figures of the space economy per stream – CAGR calculated between 2012 and 2016

UPSTREAM
€92bn / $102bn
(CAGR +1%)

Commercial satellite market
€12bn / $14bn (CAGR -8%)

Launch market
€5bn / $5.5bn (CAGR -7%)

Institutional budgets
€74bn / $82bn (CAGR +3%)

MIDSTREAM
€28bn / $31bn
(CAGR +2%)

Operators revenues
€19bn / $21 bn (CAGR +2%)

Ground infrastructures and operations
€9bn / $10bn (CAGR +1%)

DOWNSTREAM
€187bn / $207bn
(CAGR +2%)

Space Services
€95bn / $105bn (CAGR +3%)

Consumer equipment
€92bn / $102bn (CAGR +2%)

END-USERS

- Oil and gas
- Insurance
- Agriculture
- Marine economy
- Telecom
- Smart cities
- LBS
- Defence and security
- Etc.

Space is...

- A diverse sector with multiple specificities, driven by complex geopolitics and market dynamics
- A halo sector, with spillovers and implications in many others domains
- A sector with a growing mindshare (Musk, Bezos, etc.) and impact worldwide (multiple new actors in the last decade)

Macro-trends impacting the space sector transversally include market evolutions and technology disruptions

Cross-cutting macro-trends

Expanded demand from new segments and players	New entrants and business models	Reduced cost to serve	Shift of risk calculus
- **Rapid expansion of emerging markets** (e.g. Africa, Southeast Asia) - **Ubiquitous demand** driving commercial mobility segment, and replacing, in some cases, dwindling demand from linear content - **Additional capacity need** from connectivity, internet of things, 5G backbone	- Emphasis on **commercial value of space over government**/military - **Use of space as a means** to provide access to content and services - Increased **vertical integration** covering platforms and services, involving all major upstream players, and leading to consolidation in the industry	- **Increased satellite constellation capacity** from Gbps to Tbps - New **designed-to-cost space infrastructures** come up beside conventional space upstream systems - Emphasis on '**good enough**' rather than state-of-the-art - **Launch costs declining** and projected to decline further by 40% with reusable vehicles	- Move from **long-term returns on large investments to rapid renewal** - **Fast failure approach to innovation** - Shift from typical **risk appetite** of defence companies to tech companies

The societal and economic impacts of investing in space are vast and far reaching for all space domains

Cross-cutting macro-trends

Figure 2: Overview of impacts assessed by PwC for European space programmes

Transactional impacts of spending into assets	Enabled and catalytic impacts	Domains / programmes
PwC observed a trend of **1.4 to 2.0 GDP multipliers** over many recent European Space Programme studies PwC observed a trend of **1.2 to 2.4 employment multipliers** over many recent studies on European space programmes **Government (Tax) revenues a sizeable percent of the original investment** for all programmes (generally >35%)	**Sales multipliers of 4 to 8** **Spillover factors of 1.8 to 3.2** **Sizeable societal impacts** **Environmental impacts**	Copernicus, ESA EO Programmes GovSatcom Galileo and EGNOS Ariane 5, Ariane 6, Vega, Vega-C, Micro-launchers Space Situational Awareness Science, Exploration In Orbit Economy

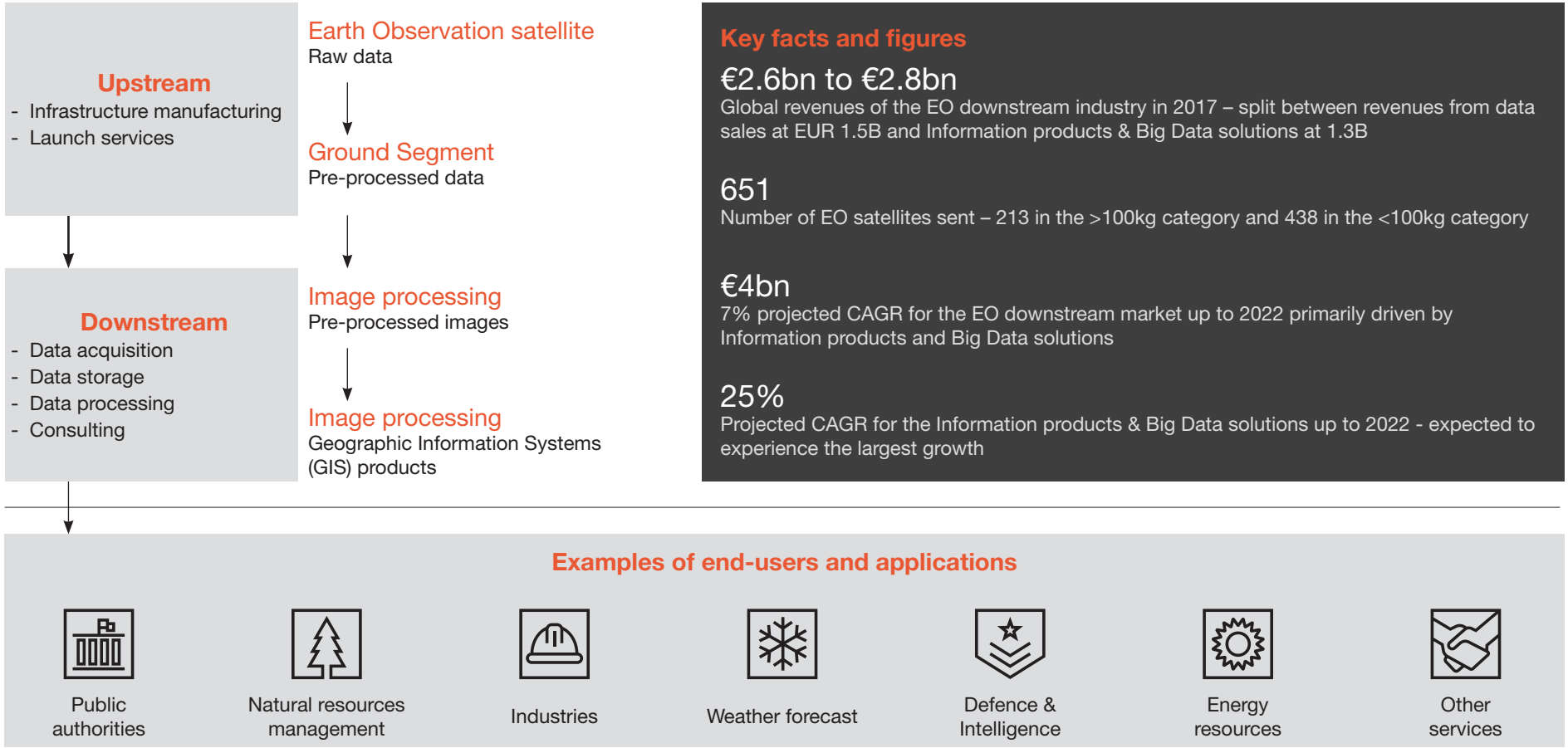
Assessed space programmes have instrumentally contributed to European soft power, strategic independence and competitive advantage

- Stimulation of European space industry
- Establishment of Europe as a space leader
- European data independence
- Increased innovation
- Improved relations with non MS nations & entities
- Increased European influence & soft power

Earth Observation is a long-established domain experiencing growth and an interest boost, and key disruptions

Earth observation

Figure 3: Earth Observation value chain



The market trends point towards a democratisation of the EO market, but new markets' adoption of EO has yet to take off

Earth observation

Trends in the EO Market

Upstream Market Trends

- HAPS
- Small Sat & Constellations
- On-board Processing

Data Exploitation Market Trends

- Machine Learning & AI
- Cloud Computing
- Data Fusion & Analytics

Trends in the EO Market

Changing Market Dynamics

- Vertical Integration - Data providers are becoming analytics providers
- Cost Reduction - Access to computing power and storage capacity is becoming cheaper thanks to cloud technologies

Move towards Open Innovation

- A number of open data sources for EO data are becoming available (Landsat, Copernicus)
- Increase in innovation with open source tools (GitLab, Jupyter, Docker)

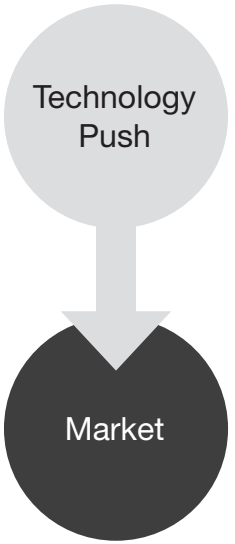
Emerging Platform Paradigm

- Thanks to digitalization of geospatial marketplaces, satellite data providers are moving to a subscription-based business model

Need for Actionable Intelligence Solutions

- End-users of Earth Observation data do not have strong technical knowledge or storage capacity in-house, and so require very specific insights

Key Challenge: Low Market Adoption



- Lack of awareness from executive decision-makers
- Reluctance to invest in large digital transformation projects

The market trends point towards a democratisation of the EO market, but new markets' adoption of EO has yet to take off

Earth observation

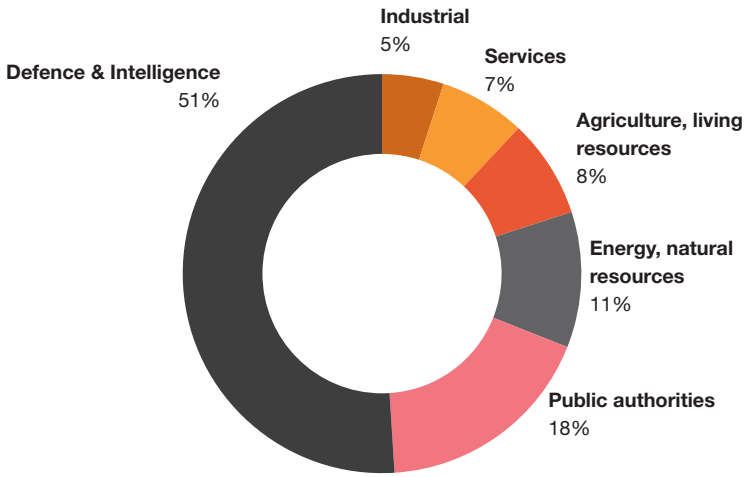
Trends in the EO Market

- Between 2011 and 2017, the **number of EO payloads** sent has been multiplied by more than 7, thanks to the growing nano-satellites market.
- **Incumbent market** leaders such as Digital Globe and Airbus are facing increasing **competition from New Space** companies such as Planet and Spire who establish their differentiation on analytics and insights.
- **Advancements in High-Altitude Platforms** (HAPS) and unmanned aerial vehicles offer complementary solutions to satellite-based earth observation.

Trends in the EO Market

- The **revenue shares of medium and low resolution imagery is decreasing**; there is a growing demand for open data services (such as services from Copernicus data).
- **High Resolution** (HR) and Very High Resolution data are strongly driven by **defence and intelligence markets**, with commercial markets catching up and presenting high growth rates, with **CAGR between 12% and 16%** expected in the coming years.
- **Revenue from data-based products** and big data analytics are growing and are expected to become the **largest share of revenues by 2020.**

Figure 4: Segmentation of EO HR Market by industry vertical applications



The European EO Programme Copernicus provides various economic, social, environmental and strategic benefits

Earth observation - The Copernicus case

Copernicus Programme - In a Nutshell

- As of 2018, a **total of EUR 6.5 billion** has been co-invested by the European Commission and the European Space Agency into the Copernicus programme, EU's flagship EO programme.
- By the **end of 2020**, the programme is expected to represent a total of **EUR 8.2 billion in investments**.
- Includes the EO satellites (Sentinels and contributing missions) and numerous in-situ sensors.
- Copernicus has six thematic services - **Land, Marine, Atmosphere, Climate, Emergency and Security** - supporting the development of many applications.
- Generates **economic benefits between EUR 16.2 and 21.3 billion** (excluding non-monetary benefits), through the added value created in the upstream space industry, the sales of Copernicus-based applications by downstream service suppliers and the exploitation of Copernicus-enabled products by end users in various economic sectors.

Cumulated economic impacts

€8.2bn
Overall investment in the programme from 2008 to 2020

€11.5bn
Cumulated economic value from the Upstream to the Downstream including...

€4.7bn to €9.8bn
...for intermediate users (downstream) and end-users (93% of these economic benefits are associated to end-users)

17,260 jobs years
supported in Europe

Example of impacts of Copernicus

Social impacts
- Reduced casualties in natural disasters
- Improved robustness for food security
- Improved management of air quality in cities

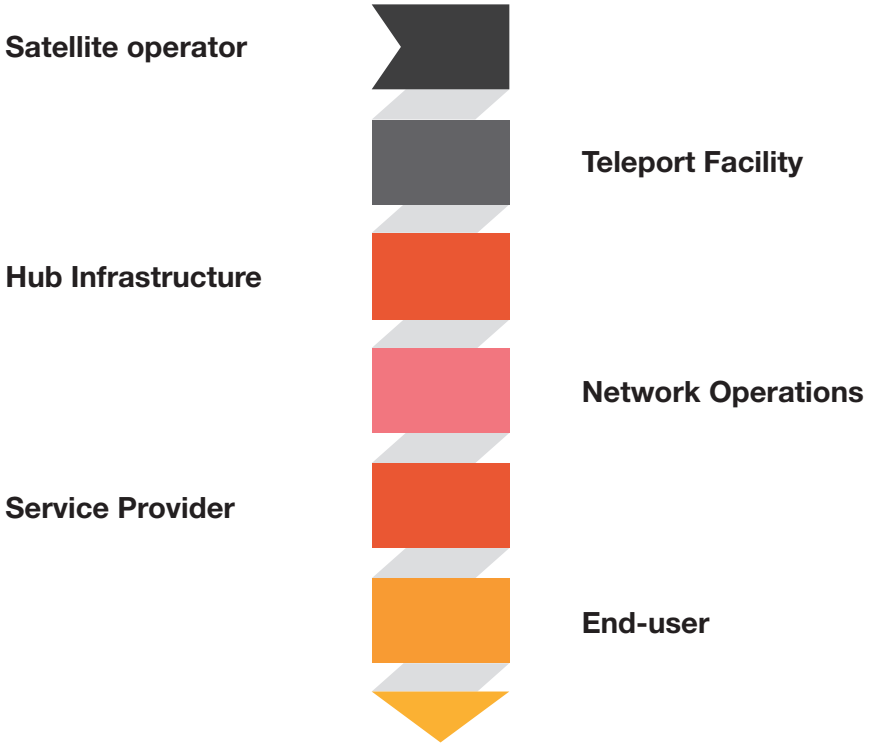
Environmental impacts
- Reduced areas burnt by wildfires through better civil protection responses
- Higher accuracy for the monitoring of compliance with environmental policies
- Reduced oil spill damages on ecosystems
- Improved fish stock management

Strategic impacts
- Strengthened collaboration between states at global scale for civil protection
- Development of EU industry competitiveness

The satellite communication domain is still by far the largest services market

Satcom

Figure 5: Satellite Communication Value Chain



Key facts and figures

Around $130 bn
Estimated global market for satcoms, from upstream to downstream (2017)

Around 80%
Share of the revenues of the satcom market generated in the downstream (2017)

470
Estimated number of satcom in operation in 2017

5 Prominent LEO operators
Oneweb, Amazon, Telesat, SpaceX and LEOsat all eyeing services from LEO markets

Business Model
Focused around the management of end user segments by leveraging the capabilities of the network infrastructure

The SatCom domain presents several challenges, due to terrestrial competition and maturing markets

SatCom

Satcom trends

Pressure Points

- Capacity Prices – A steep fall in capacity pricing of 18% in 2018

New Business models and Architecture

- Hybridisation of network – Combining MEO and GEO assets to form a unified network
- LEO Smallsat constellation – Drive towards developing high throughput, global coverage mega constellations with hundreds or thousands of satellites per operator

GEO Communication Trends

- Small satellite – Entrance of small satellites in GEO targeting specific market segments (consumer broadband) and regions (North America). Eg. Astranis
- Large satellite – Sharply declining GEO satellite orders, going from 15+ in 2014, to a few in 2017

Space Segment Technology

- Space Segment – Drive for high throughput satellites across GEO, MEO and LEO
- Inter-satellite links – Development of inter-satellite links to reduce the pressure on ground networks

Ground Segment Technology

- Flat Panel Antenna: Drive towards developing antennas with a low drag profile for mobility applications (e.g. IFC)
- Compatible Antenna: Drive for developing an single antenna solution with orbital (LEO, MEO and GEO) and spectrum compatibility (Ku-Band, Ka-Band)

Key facts and figures

- **New services** to address (IFE, M2M/IOT…)
- **Aviation and Maritime** domains as potential **growth** sectors
- **Broadband** (BB) connectivity as a **main focus** of consumer markets
- **Managed services** (corporate networks, VSAT, Governmental services) as f**ast growing markets**
- Mega constellations as enablers to compete with terrestrials system and have a **global BB coverage**
- **Multi-service consumer equipment** as a big market

Navigation satellites provide positioning and timing data to an ever-expanding user base

Navigation

A vital asset for safety, performance and leisure

Today global navigation systems provide information about positions, routes, speed and timing, and are used by an extremely wide range of users in every economic sector.

Navigation signals are freely emitted by public entities, and their exploitation drives significant economic activity.

Pushing for greater accuracy

The development of multi-constellation receivers (compatible with multiple GNSS signals) is expected to result in greater uptake by end users and enhance performance in terms of accuracy and integrity.

In addition, navigation signals will have to resist jamming and spoofing threats.

Capitalising on existing markets

Location-Based Services (LBS) and in-vehicle equipment are undergoing significant development, with LBS benefiting from the fast growing apps market.

GNSS-enabled businesses (device manufacturers and service providers) are not expected to change greatly in the years to come.

End-user demand is expected to grow in the years to come, especially for high precision and indoor positioning. Augmented signals enable cross-market applications such as precision farming, oil and gas exploration and fleet management.

Key facts and figures

4
GNSS constellations providing global signals: GPS, Glonass, Galileo and Beidou satellites

82
Global and regional navigation satellites in operation in 2018

€94.8bn
Estimated global navigation market revenues in 2015 and €96.8bn projected market revenues for the Asia-Pacific region in 2025

Galileo is Europe's GNSS civil programme, providing a highly accurate, guaranteed, global positioning service

Navigation

First GNSS to be under civil control

The aim of the Galileo programme is to provide the first global navigation satellite system under civil control, for the public and private use of European and global entities.

Providing a set of four high-performance services worldwide

Open Service	Free of charge to user, providing positioning and synchronisation information for high-volume navigation applications
High Accuracy Service	More secured and precise service delivered through encrypted signal for applications such as safety-of-life
Public Regulated Service	Restricted to government-authorised users, for sensitive applications requiring a high level of service continuity, free of charge for European institutions and MS
Search and Rescue Service	Contributing to COSPAS-SARSAT, Galileo will offer a unique link alert informing the sender that their distress message has been received

The Galileo programme was created to answer Europe's strategic need of a reliable European satellite navigation signal, and to foster the development of economic and societal benefits

Key facts and figures

€7.1bn
Financial envelope covering the development, deployment and management of the Galileo programme between 2014 and 2020

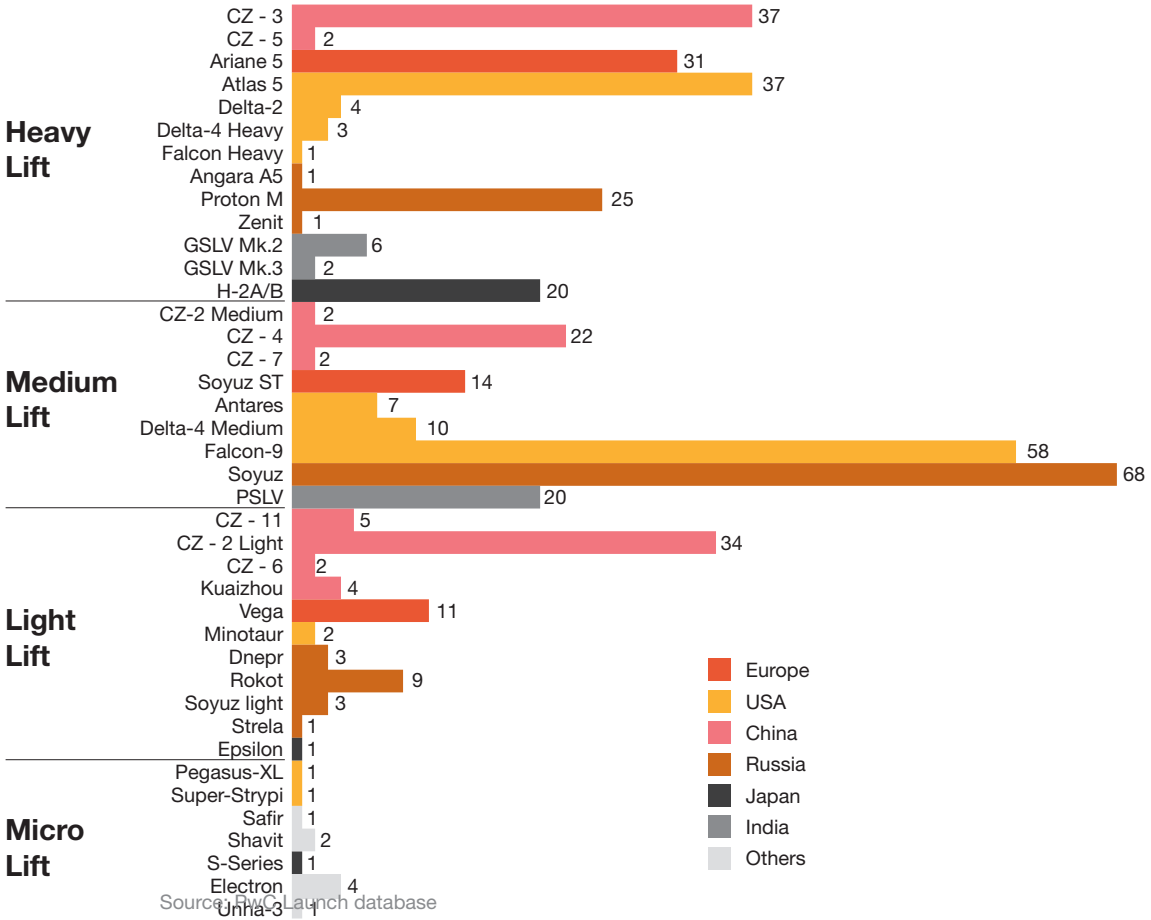
30
Number of satellites composing the final Galileo constellation. As of May 2019, 26 Galileo satellites have been deployed

728M
Estimated number of Galileo-enabled smartphones

Today, different classes of orbital launchers are being used around the world, almost exclusively by 6 spacefaring regions

Access to space

Figure 6: # orbital launches (2014 to 2018) per vehicle class, family and launching region



Source: PwC Launch database

Key facts

- The **launch market** is estimated at $8bn (2018 figures)
- The US, China, Russia, Europe, India and Japan are the **most mature spacefaring nations**
- The sector is **heavily supported by public agencies through subsidies, share of assets** (e.g. launch infrastructures) and a **recurring launch demand**
- The launch market can be segmented by two types of customer: institutional and commercial
- On the **institutional market, most of the launches are not open to competition** (use of local vehicles for local institutional customers)
- On the **commercial market, there is currently a duopoly between SpaceX** (Falcon 9 and Falcon Heavy) and **Arianespace** (Ariane 5, Soyuz ST, Vega)
- **Russia progressively lost confidence of commercial satellites operators** due to several launch failures in the last 10 years
- **China** is commercially aggressive in providing **turn-key solutions** (launcher + satellite) to emerging countries

There are several trends around the development of new capabilities aiming at lowering the cost to access to space

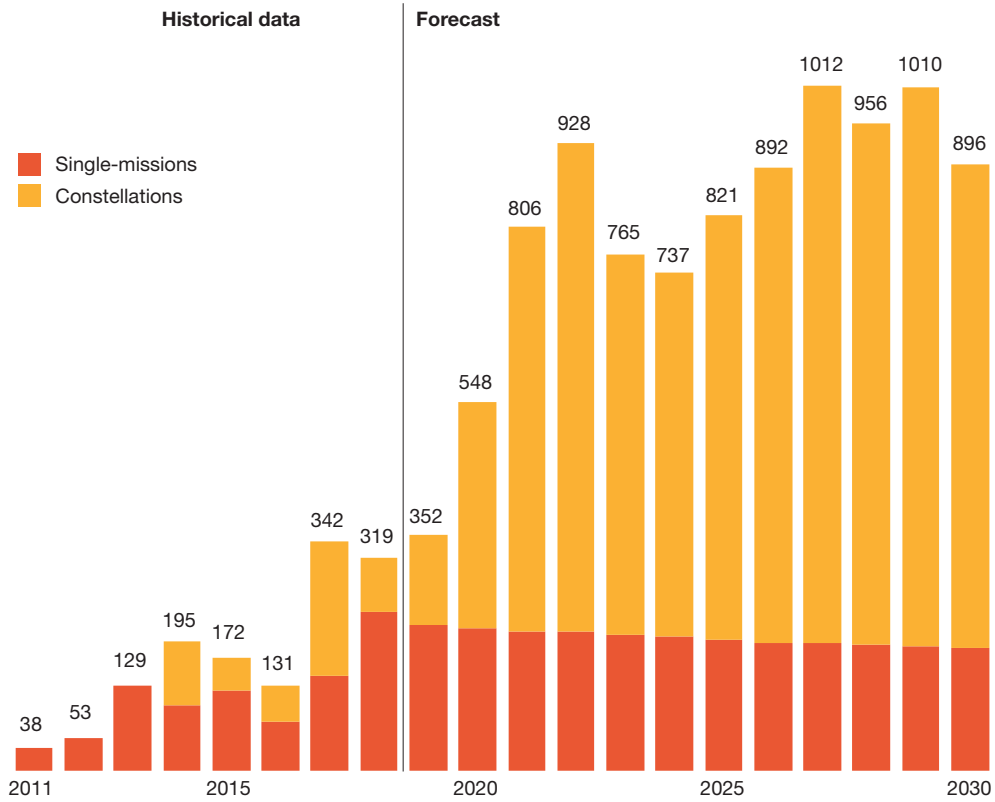
Access to space

Reduction of the cost to access to space	Pushed by a fiercer competition, launcher companies are aiming at reducing the development, manufacturing and operation costs with the objective to be price competitive.
Development of partial to fully reusable launchers	Several companies are developing launch systems that could be operated like conventional aircraft (launch, land, fuel, re-launch).
Progressive introduction of new generation of launchers worldwide	The current families of orbital capable launchers are expected to be replaced starting from 2020. Examples of new generation vehicles include Ariane 6, Angara, H-3, Vulcan and Long March 5.
Development of modular launch systems	Launcher companies are aiming at creating economies of scale by maximizing the modularity of their vehicles through the use of components on different launcher families (e.g. Epsilon first stage as a booster of H-3, Vega-C first stage as a booster of Ariane 6).
Engines using LOX/ Methane propellants	The use of liquid oxygen and methane as propellants would lead to significant gains such as simpler and lighter launcher design, reusable-friendly engines and easier storage and handling. US, Europe and Japan are known to be currently developing methane engines.
Development of super-heavy launchers aiming at Moon or Mars missions	Super-heavy launch vehicles are being developed by the US, China and Russia for deep-space missions or the delivery of heavy payloads such as space stations modules. Examples include Starship/Super Heavy, Long March 9 and SLS.
Development of micro-launcher systems from new entrants	Pushed by a promising market for the delivery of small satellites, currently more than a hundred of micro launchers projects are being developed around the world, often by new entrants, supported by local agencies.

The trend related to the development of micro-launcher projects is driven by the need of operational responsiveness

Access to space

Figure 7: #smallsats (<500 kg) for single missions and constellations to be launched from 2011 to 2030



Source: PwC Launch database, more than 70 constellations projects are considered in the forecast

Key facts

- PwC forecasts that in the coming years, a large volume of satellites below 500 kg will be launched, with a large **majority coming from constellations programmes.**
- **80% of the smallsat demand will be driven by the commercial market** stimulated by the demand from commercial Earth Observation and communications constellations.
- To deliver these small payloads, **satellite operators are looking for cost effective and flexible launch solutions** that cannot currently be offered by larger vehicles.
- To capture this market, several small launcher projects are ongoing with currently **more than a 100 micro-launcher projects announced** with diverse degree of maturity.
- Launcher manufacturers involved in heavier rockets are also developing **solutions to address the smallsat market** (e.g. dispensers).
- In order to **develop local access to space capabilities** and thanks to lower entry barriers (compared to heavier-class launchers), several emerging space nations announced their support in micro-launcher and spaceport projects.

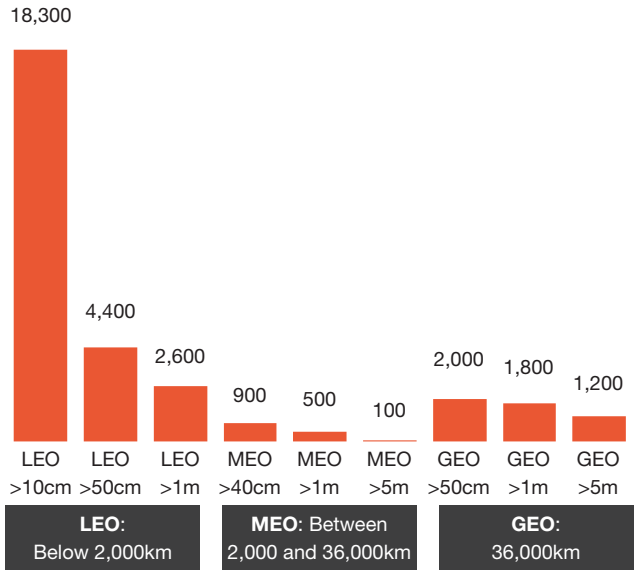
The issue of space security is a global concern necessitating a common and international alignment

Space Situational Awareness

Space debris threatening the sustainability of space

Space debris in the context of SST refers to man-made objects in space (as opposed to meteoroids and asteroids) that have lost their functionality.
Space debris is mostly present in regions of space closer to Earth, such as the LEO, MEO and GEO.

Figure 8: estimated #debris per orbit and size



Global SST Capabilities and actors

Space Surveillance and Tracking (SST) is the monitoring and analysis of the evolution of space objects in order to issue adequate warning in case of potential threats.
Even if main space faring nations possess SST capabilities, there is no international mechanism for verifying exchanged SST information.

Global SST Capabilities and actors	Large network of sensors providing the most comprehensive catalogue of space objects. Will soon be updated with the "Space Fence", which can track up to 200,000 objects.
USA Space Surveillance Network	Pooling of national SST capabilities, improving SST data sharing across Member States and setting up a common SST service provision front desk.
Russia SKKP	Contains a catalogue of space objects similar to that of the US but does not involve itself in data sharing on the same scale as the US, nor does it have a publicly available catalogue.
China Unknown	China maintains a "Space Debris Monitoring and Application Centre" as part of CNSA. It is therefore believed to have space tracking assets, but information on this is scarce.

Ways forward being considered

Active Debris Removal	Removal of large debris in order to support the long term sustainability of space orbits. Consisting of de-orbiting debris into Earth's atmosphere, or sending them to a graveyard orbit.
In-Orbit Servicing	Servicing dysfunctional spacecraft by refuelling it, repairing it or performing maintenance in order to expand the spacecraft's lifetime.
Space Traffic Management	Enforcement of technical and regulatory standards ensuring that all current and future space activities coexist without jeopardising one another.

Challenges posed by the security paradox

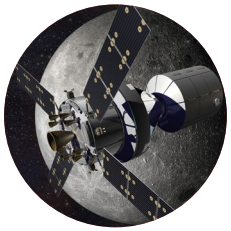
Space debris removal capabilities can in principle be used to damage and disable other satellites.
Sharing of SST data related to the position of a nation's satellites presents a conflict of interest with national security as SST capabilities can be utilised for defence purposes.

Collaborative efforts are highly important towards a global catalogue of space debris. It is important that nations also maintain an independent SST capability and not rely solely on their allies for information.

Space Exploration is a collaborative activity that requires partnerships, hence an integrated global exploration roadmap

Space Exploration

Exploring: Where ?



Cislunar

Mars

Moon

Low Earth Orbit

Major agencies worldwide

ASI Agenzia Spaziale Italiana
Australian Space Agency
CNES
CNSA
CSA ASC
CSIRO
DLR
esa European Space Agency Agence spatiale européenne
ISRO
JAXA
KARI Korea Aerospace Research Institute
NASA
STATE SPACE CORPORATION ROSCOSMOS
وكالة الإمارات للفضاء UAE SPACE AGENCY
НАЦІОНАЛЬНЕ КОСМІЧНЕ АГЕНТСТВО УКРАЇНИ
UK SPACE AGENCY

Goals

Expand human presence in the solar system

- Ensure continuity of human space-flight and continued utilization of LEO
- Enable sustained living and working around and on the Moon
- Enable sustainable human missions living and working around and on Mars

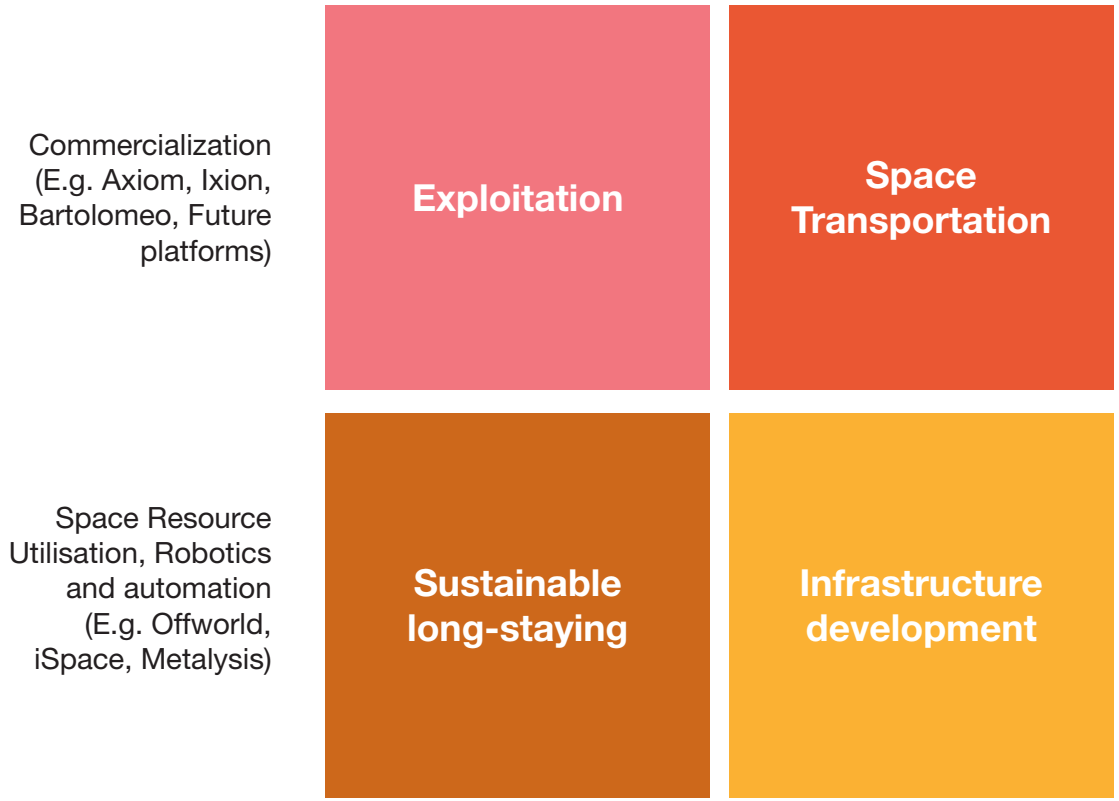
Understand our place in the universe

- Study the origin and evolution of the Earth and the Moon system, the solar system and the Universe
- Search for evidence of past and present life and the origin of life on Earth
- Investigate habitability of potential human destinations

Commercial players are already playing a role in space exploration and exploitation, and are attracting capital

Space Exploration

Figure 9: Space activities conducted by commercial players in the field of space exploration



Key facts

- A sector driven by government spending, producing extensive economic spillovers
- Private ventures are starting to appear, mostly around SRU, but also leveraging technology spillovers towards low-earth orbit economy
- Government agencies and banks are considering innovative ways to finance risky, long-term return endeavours like space exploration

Space regulations must comply with international laws that directly impact the domestic regulation of space activities

Space law, regulations, procedures

Figure 10: International space laws and regulations

Outer Space Treaty (OST, 1967)	International Conventions	UNOOSA Guidelines
- State Supervision and Liability - Non-appropriation and freedom of exploration - Non-militarization and non-weaponization of space	- **1972**: Convention on international liability for damages caused by space objects - **1975**: Convention on the registration of objects launched in outer space - **1979**: Agreement governing activities on the Moon and other bodies	- **2010**: Space Debris Mitigation Guidelines

Figure 11: Domestic laws and regulations

Compliance with international law & guidelines		The operation of space objects
- Space Debris Mitigation - Environmental protection - Liability to third-party and space insurance - Safety of humans and properties	→ Domestic laws directly affect the regulation of the operations of space objects →	- Sounding rockets & sub-orbital launches - Orbital launches - Launch permit - Satellite operations

Regulatory differentiation has become an attractiveness lever for space nations

Space law, regulations, procedures

Space regulations are mostly country-specific - Overview

States that have enacted national space legislations have taken **highly divergent approaches:**

- **Some countries only have a national space law**, others have several laws or a **number of regulations under the law**
- **States have defined their legal/regulatory framework according to the state of national space industry**, actual commercial space activities, or national governance
- The **governance** and namely the allocation of responsibilities between the different competent governmental bodies is **country-specific** (Cabinet Office, a ministry, an agency or even several agencies)

Levers for attractiveness

Regulatory levers can impact the attractiveness to space players of a country in several ways.

Space regulation levers include:

- Procedures duration
- Application fees
- Insurance amount to be underwritten by applicants

Traditional regulatory levers include:

- Tax law
- Corporate law (including bankruptcy law)
- Economic law in general impacting the ease of doing business

Elements affecting the attractiveness of a licensing / authorization process

Time duration of licensing procedures: Duration of procedures can vary from 1 to 6+ months

Pre-consultation processes: Pre-consultations can shorten application delays

Inter-agencies process: Inter-agency processes can increase application delays

Fast-track procedure: Fast-track procedures shorten application delays

Insurance: Can be tailor-made or be fixed at sometimes more than $600M and may have deterrent effects for smaller businesses

Fees: Can be tailor-made or be fixed at sometimes more than $6,000 and may have deterrent effects for smaller businesses

Several new regulatory challenges lie ahead of the space community

Space law, regulations, procedures

Figure 12: Examples of regulatory challenges

"Flags of convenience" in outer space

Current race towards loose regulations in order to attract more spacecraft and activity (regulatory competitiveness). This creates a problem of "flag of convenience", like in maritime law, where everybody goes for the same country, creating potential safety hazards for passengers, other spacecraft and the environment.

Prospects of a militarization of space

There is a current trend towards the development of new space military capabilities including military space forces or energy-directed weapons that could violate the Outer Space Treaty or go against guidelines such-as the space debris mitigation guidelines (2010).

Commercial Human Space-flight

A new legal framework to develop in relation to the insurance of crew members, third-parties and the registration of the space object (orbit, trajectory…).

Laws governing the colonization of celestial bodies (Moon, Mars)

The Moon Agreement is set to evolve in order to allow for the installation of permanent lunar bases and should protect the "Lunar Heritage Sites". This also extends to challenges regarding the regulation of Space Resources Utilization.

Recent developments in Space Policy: Luxembourg's space policy is designed to favour business attractiveness

Space policy – Luxembourg case study

Luxembourg's long-lasting involvement in commercial Space has been renewed in the past years

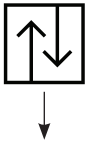
- Luxembourg entered into space in 1985 (creation of SES) and became the 17th Member State of ESA on June 2005
- A Luxembourg Space Policy was initially drafted in 2008 to detail the priorities in terms of developing space activities
- In 2017, Luxembourg's pioneer space resources economy initiative is introduced through the Law on the Exploration and Utilization of Space Resources
- The law ensures legal stability and guarantees a high level of protection for investors, explorers and miners regarding their rights on resources extracted

Main objectives of the Luxembourg Space Policy

- Contribute to the diversification and sustainability of economic activities in Luxembourg
- Consolidate and enhance skills in the space, telecoms and media sectors as well as in ground systems
- Give an international dimension to Luxembourg space activities and their competitiveness
- Implement the space resources utilization initiative (The spaceresources.lu initiative)

Sets of policy tools developed to attract businesses

- The Luxembourg Space Agency
- LuxIMPULSE, the national space program
- Luxembourg Space Fund (a VC vehicle)
- Space Research Programs funded at national level
- Various national attractiveness initiatives including an investor-friendly environment



Companies present along the entire value chain:

Upstream
- Luxspace / Spire / GomSpace / iSpace…

Midstream
- SES / Luxspace / Teralink Solutions…

Downstream
- KLEOS / Blue Horizon / Earthlab Galaxy…

www.pwc.fr/space

If you have any questions or wish to discuss the space sector and the challenges it faces, please contact our team leader:

Luigi Scatteia
Partner, France
PwC Space Practice Leader
+33 6 42 00 71 67
scatteia.luigi@pwc.com

About the PwC Network

At PwC, our purpose is to build trust in society and solve important problems. We're a network of firms in 157 countries with more than 236,000 people who are committed to delivering the highest quality solutions.

About the PwC Space Practice

The PwC Space Practice is part of PwC Advisory and fully dedicated to the space sector. The core team based in Paris includes specialised professionals supported by additional contacts handling space consulting across the global PwC network. Our expertise covers the entire space sector and spans the value chain, from upstream to downstream. We help entities, public and private, face their business, technological and governance challenges in constantly changing environments.