arianespace
arianeGROUP

ARIANESPACE, THE SPIRIT OF SUCCESS

December 24, 1979: The first Ariane rocket lifts off from its pad at the Guiana Space Center and successfully reaches orbit above Earth's atmosphere — a groundbreaking achievement for Europe's independent access to space. Arianespace was founded the following year to offer European launch services to Europe and the rest of the world.

Here we are 40 years later, with over 100 satisfied customers, as well as a track record of more than 300 launches that have delivered over 600 satellites to orbit.

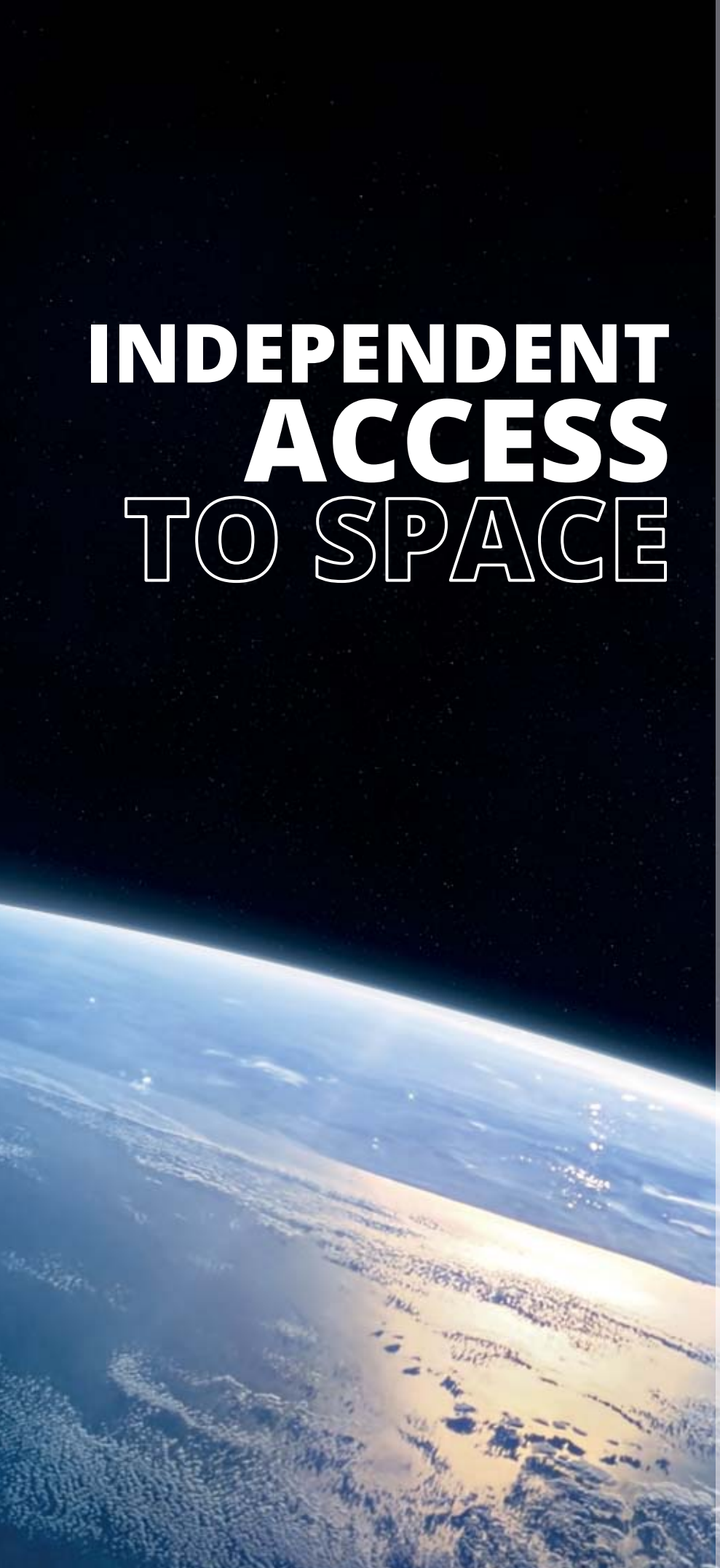
We are proud that more than half of all commercial satellites now in service were launched by our Ariane, Soyuz and Vega vehicles. This is the result of our three key assets: reliability, availability and competitiveness. However, we never take success for granted. This is why Ariane 6 and Vega C will enter service soon, while we continue to innovate to answer all future needs — from low Earth orbit to the Moon and beyond.

We share your vision for the development of space, to the benefit of all. Every successful mission is a step forward for connectivity, security, planet protection or science — with the goal of a better life on Earth. This is what makes each of our launches so vital and invaluable. It is also why our teams are so passionate about what they do. Because they know so well that in the space industry — more than in any other sector — success can only be a result of shared passion and teamwork.

With our teams and partners, we are totally dedicated to your success, and your success alone.

STÉPHANE ISRAËL
CEO, ARIANESPACE

INDEPENDENT ACCESS TO SPACE



Arianespace was created in 1980 to guarantee Europe's independent access to space while offering competitive and dependable launch services to all markets.

Arianespace is a subsidiary of ArianeGroup, which holds nearly 74% of its shared capital. Our 16 shareholders represent the entire European space industry, including MT AEROSPACE AG (8.3%), AVIO Spa (3.4%), S.A.B.C.A (2.7%) and RUAG Schweiz AG (2.7%). ESA and CNES are its censors.

We provide both commercial, operators, governments, European public institutions, and space agencies a wide range of launch options for any payload. Our customers have deployed diverse spacecraft, from experimental satellites weighing just a few kilograms to 20-ton Automated Transfer Vehicles that resupplied the International Space Station (ISS).

How will you use our capabilities?

Arianespace is the world's first commercial launch services company. We share our 40 years of experience and "savoir-faire" with each of our clients to co-develop a mission that delivers on their requirements.

Together, we have already sent more than 600 satellites into orbit, extending the boundaries of Earth.

ANY MASS, TO ANY ORBIT, ANY TIME

From experimental mini-satellites to navigation constellations to high-definition communications satellites to complex space probes.

Sun-synchronous orbit
400 - 1,000 km
Observation, weather

Escape trajectory
(Delivery beyond the Earth's gravitational pull)
Science, research

Geostationary Transfer Orbit
200 - 36,000 km
Telecommunications, broadcast, high-density data relay

Medium Earth Orbit
2,000 - 36,000 km
Navigation

Low Earth Orbit
Up to 2,000 km
ISS services, observation, data relay

VEGA | SOYUZ | ARIANE 5 | VEGA C | ARIANE 62 | ARIANE 64

COMMUNICATIONS

MORE SPACE TO CONNECT

The power of connection everywhere

Satellites enable ubiquitous, high-quality and accessible communications, connecting people with real-time data no matter where they are — even while traveling by the air or on the high seas.

Connectivity is entering a new era with IoT (the Internet of Things).

A family may use IoT to access its home to turn on lamps and heating, or even feed a pet, from afar. Increasingly, IoT is enabling machine-to-machine communications. On the factory floor, robots can directly order replenishment parts from the inventory system, while engineers have the ability to monitor and manage production rates.
And in a smart city, traffic lights and energy prices could be adjusted based on data, thereby matching flow with demand.

Delivering life-like images, reliably, to many

Ultra-high definition TV delivers stunning images, and requires a workhorse, high-capacity satellite to distribute and relay these images directly to consumers' homes. Coverage is broad; connections and delivery speed reliable, even over long distances and in remote areas. Ultra-high definition TV can even be delivered in-flight — which is especially attractive for live sports and events.

The deployment of new connectivity constellations will enable better satellite coverage and a global access to internet. These devices in low orbit eventually will give access to the worldwide network for all the inhabitants of the planet, even in the remotest locations. Objective: covering 100% of the planet with internet access from space.

ARIANE 5
THE HEAVY-LIFT LAUNCHER

Ariane 5 overview

Ariane 5 is the world reference for heavy-lift launch vehicles. More powerful than 10 Airbus A380s put together and as tall as the Arc de Triumph, the Ariane 5 ECA can launch over 10 metric tons into geostationary transfer orbit, making it the world's preferred choice for telecommunication satellites.

Industrial prime contractor: **ArianeGroup.**

10 meters

ATV CONFIGURATION
Ariane 5 ES

DUAL LAUNCH CONFIGURATION
Ariane 5 ECA

- The **GTO** benchmark
- Applications: Telecommunications, Science

106
LAUNCHES
as of December 2019

218
SATELLITES ORBITED
as of December 2019

Up to **10,200kg**
of separated mass in 6-deg. inclination geostationary transfer orbits

50.5m
HEIGHT

5.4m
DIAMETER

780t
MASS AT LIFT-OFF

Unparalleled position of Europe's navigation system

With combined signals from the GPS and Galileo systems, the 4-5 billion mass-market devices currently available provide an accuracy that allows users to move around a city crowded with high-rises, to trek through a remote forest or to find a desired service in a large shopping center.

Indeed, the Galileo constellation is nearly complete — with 26 satellites launched, (24 active and the remaining backup) in space — providing initial services since December 2016. Combined with GPS on most receivers, it provides much better accuracy. Because position, velocity and timing can be determined down to a few centimeters, the service will be the backbone for new security, rescue and context-aware applications.

The 26 satellites were launched from 2011 to 2018 by Soyuz and Ariane 5. Launches will resume in 2020 with Ariane 6.

The Galileo program's current Full Operational Capability phase is managed and fully funded by the European Union. The European Commission and ESA have signed a delegation agreement by which ESA acts as design and procurement agent on behalf of the Commission. The European GNSS Agency (GSA) now manages the operations and the provision of services to the user community.

From the smallest planet to a vast swath of stars

The ESA's BepiColombo space probe to Mercury will help scientists better understand this little-explored planet by providing data on its structure, magnetic fields and atmosphere. The probe began its 9-billion-kilometer, seven-year journey to Mercury with a launch by Arianespace in September 2018.

In 2013, Arianespace lofted the Gaia observatory, which is positioned at 1.5 million kilometers from the Earth for an ambitious mission to create a three-dimensional map of one billion stars in our galaxy — the Milky Way.

As of 2018, ESA had published the most detailed map of our night sky using data from Gaia, with precise positions of a record 1.7 billion stars.

Looking ahead to 2021, an Ariane 5 will launch the James Webb Space Telescope, which will send researchers "back in time" to the origins of the universe.

MORE SPACE TO EXPLORE

SOYUZ
THE MEDIUM LAUNCHER

Soyuz overview

With more than 1,900 launches completed, there is no doubt that Soyuz is the most prolific and versatile rocket of its class. It is an iconic name in the space industry, having launched the first man into space — Yuri Gagarin — in 1961. Soyuz is Arianespace's standard solution for mid-range payloads, spanning applications for Earth observation, science, navigation and telecommunications.

Prime contractor: **Roscosmos**

10 meters

SINGLE LAUNCH

CONSTELLATION

MULTIPLE LAUNCH

49 LAUNCHES
as of December 2019

23 BY ARIANESPACE FROM FRENCH GUIANA
FROM 2011 TO DECEMBER 2019

26 BY STARSEM FROM BAIKONUR COSMODROME
FROM 1999 TO 2013

A versatile performer with varied payloads to different orbits

3,250kg
PAYLOAD TO **GTO**

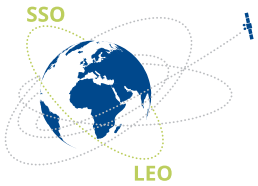
4,850kg
PAYLOAD TO **LEO**

1,645kg
PAYLOAD TO **MEO**

46.2m
HEIGHT

4.1m
DIAMETER
PAYLOAD FAIRING

308t
MASS AT LIFT-OFF



VEGA
THE LIGHT LAUNCHER

Vega overview

Commissioned in February 2012, the European four-stage launch vehicle is tailored to carry the growing number of small scientific satellites and other lighter-weight spacecraft under development or planned worldwide.

In lofting observation satellites — such as the Sentinel Earth observation spacecraft for Europe's Copernicus program — Vega delivers its payloads to Sun-synchronous, low-Earth orbit.

Industrial prime contractor: **AVIO**

SINGLE LAUNCH

MULTIPLE LAUNCH

- Earth observation
- Science

15
LAUNCHES
as of December 2019

29
SATELLITES ORBITED
as of December 2019

1.5t
PAYLOAD TO **CIRCULAR POLAR ORBIT**

29.9m
HEIGHT

3.0m
DIAMETER

137t
MASS AT LIFT-OFF

EARTH OBSERVATION

Ocean surface acidity pH 8.07

Emperor penguin population density 33/km²

Monitoring the planet, caring for its citizens

Copernicus is Europe's independent, reliable and open access to images and data about the Earth. The vast amounts of near-real-time information help to better understand and manage our planet. The satellites continuously collect more than 20 terabytes of data per day.

The data are used to:

- monitor our changing climate and biodiversity;
- enable support for sustainable agricultural practices and ensure food security;
- provide a basis for forecasting and responding to major nature disasters and humanitarian crises.

From 2014 to 2017, Arianespace launched six Sentinel satellites in the Copernicus program, providing very high resolution images and data from space.

Improving safety and security

Governments rely on observation to tackle international problems such as piracy and illegal fishing. And closer to home, to secure country borders, survey migration and flag sensitive situations.

High-resolution Earth observation satellites also serve as national intelligence and military resources. France's DGA and CNES developed the CSO-1 satellite, which was launched by Arianespace in late 2019.

MORE SPACE TO PROTECT

MORE SPACE FOR THE FUTURE

At Arianespace, we believe space is the place of infinite possibility

Ariane 6 and Vega C will deliver payloads to any orbit, anytime, and with any satellite mass for even more performance, versatility and competitivity.

Connecting all the world

Satellite constellations offer the possibility for everyone to connect from anywhere in the world. They open perspectives of communication from any place on land, sea and in the air, with global, cheap, and fast coverage. These solutions represent an opportunity for a large diversity of market segments such as travel, shipping and security operators, among others. Arianespace already is addressing this market thanks to its ability to position constellations on all types of orbits. As of September 2019, our launchers have successfully deployed 113 satellites for six different constellations.

To the moon and beyond: Gateway

Over the next decade, human beings are expected to establish a presence on the Moon. To accomplish this, technologies for the local generation of such consumables as oxygen and water will have to be validated, providing the basics needed to sustain lunar outposts.

International space agencies, including NASA and ESA, are building a new space station called the Lunar Gateway that will orbit the Moon.

In its initial configuration, the platform will act as a home base for multiple exploration expeditions — supporting human and robotic missions to the lunar surface, helping to uncover its mysteries and resources.

The ESA In-Situ Resource Utilization (ISRU) study, performed with ArianeGroup and Arianespace as part of a European consortium, aims at bringing equipment to the Moon to exploit the regolith for extracting water and oxygen. This would enable an autonomous human presence on the Moon; as well as production of the fuel needed for exploration missions further into space.

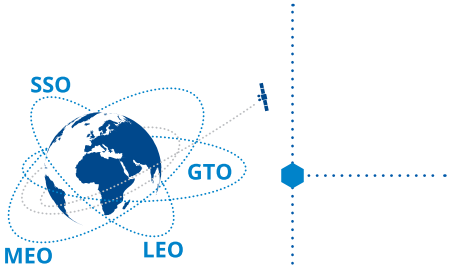
Rideshare: space for CubeSats and small satellites

Sending up small satellites for communication, observation, and experimentation is a growing demand for both commercial and institution customers.

Arianespace is commercializing a rideshare concept: co-launching many small satellites during the same mission.

Vega's Proof of Concept flight with the Small Spacecraft Mission System (SSMS), a modular carbon fiber dispenser, will be launched in 2020.

Ariane 6 will offer a Multi-Launch Service (MLS) to any orbit based on flight-proven carrying systems. Both will reduce the cost and time (SUPRR to access) for small flyers to access space. Once the rideshare concept is proven, Arianespace will run a regular service with the SSMS and MLS.



ARIANE 6

Modularity & Flexibility

The new generation Ariane 6 — a European Space Agency (ESA) program — is designed to offer both institutional customers and commercial operators the launch solutions that precisely matches their evolving needs.

Ariane 6 provides increased payload carrying capacity and the flexibility to perform a wide range of missions. The upper stage's Vinci engine — which can be restarted up to five times — will continue the Ariane program's heritage of reliability.

Providing cost-effective access to space by making extensive use of shared components — starting with the same strap-on boosters for both its versions and for Vega C — Ariane 6 aims to cut down launch costs, by leveraging economies of scale in a very novel way.

The modular launcher comprises two versions: Ariane 64, tailored primarily for the commercial market; and Ariane 62, well-suited for institutional customers.

Industrial prime contractor and design authority: **ArianeGroup**

10 meters


SINGLE LAUNCH


DUAL LAUNCH, LONG FAIRING


MULTIPLE LAUNCH


LEO HEAVY MISSION ATV


LARGE SCIENTIFIC SPACECRAFT


LEO MICROSAT CONSTELLATIONS

Ariane 64

Powered by four P120C solid propellant boosters, the Ariane 64 will deliver different type of satellites to various orbits, answering all of the market's evolving needs.

- Small to large GEO satellites in dual payload configurations
- Institutional and large scientific spacecraft
- Deployment of mega constellations with re-ignition of the upper stage
- Lofting small satellites via the new Multi-Launch Service (MLS)
- Delivery to multiple orbits during the same launch

Ariane 62

To orbit medium and heavy payloads and constellations, the Ariane 62 is powered by two P120C solid propellant boosters.

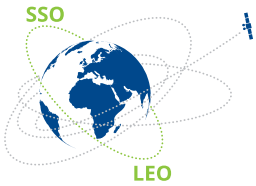
- Institutional and large scientific spacecraft missions
- Deployment of constellations, with upper stage re-ignition
- Lofting small satellites via the new Multi-Launch Service (MLS)
- Delivery to multiples orbits during the same launch

Maiden flight: 2020

62m
HEIGHT

5.4m
DIAMETER
PAYLOAD FAIRING

530t ARIANE 62
860t ARIANE 64
MASS AT LIFT-OFF



VEGA C

Optimized for light-lift market and shared launch services

Vega C, a European Space Agency (ESA) program, is an upgraded and more powerful version of the current Vega rocket.

The new launch vehicle will bring the reference payload performance in polar orbit to over two tons and will further improve Arianespace's market position for the launching of small satellites into LEO.

For the booming Earth observation market, and to meet long-term industrial needs, Vega C will have a new solid propellant motor, improved second stage, and a larger fairing to significally increase payload mass and volume capabilities for such payloads as a radar satellite or multiple nanosats, thanks to its SSMS (Small Spacecraft Mission Service) capability.

Industrial prime contractor: **AVIO**

SINGLE LAUNCH | CONSTELLATION | SSMS | VAMPIRE | VESPA C

- 75% increased performance
- Greater payload capacity to SSO (increased from 1,500 kg to 2,300 kg)
- Rideshare ready
- Competitive costs

Maiden flight: 2020

35m	3.4m	210t
HEIGHT	DIAMETER PAYLOAD FAIRING	MASS AT LIFT-OFF

A SPACEPORT FOR THE FUTURE

The Guiana Space Center is one of the world's most advanced and efficient launch facilities, enabling launches to any type of orbit. The location also enables missions to a wide range of orbital inclinations.

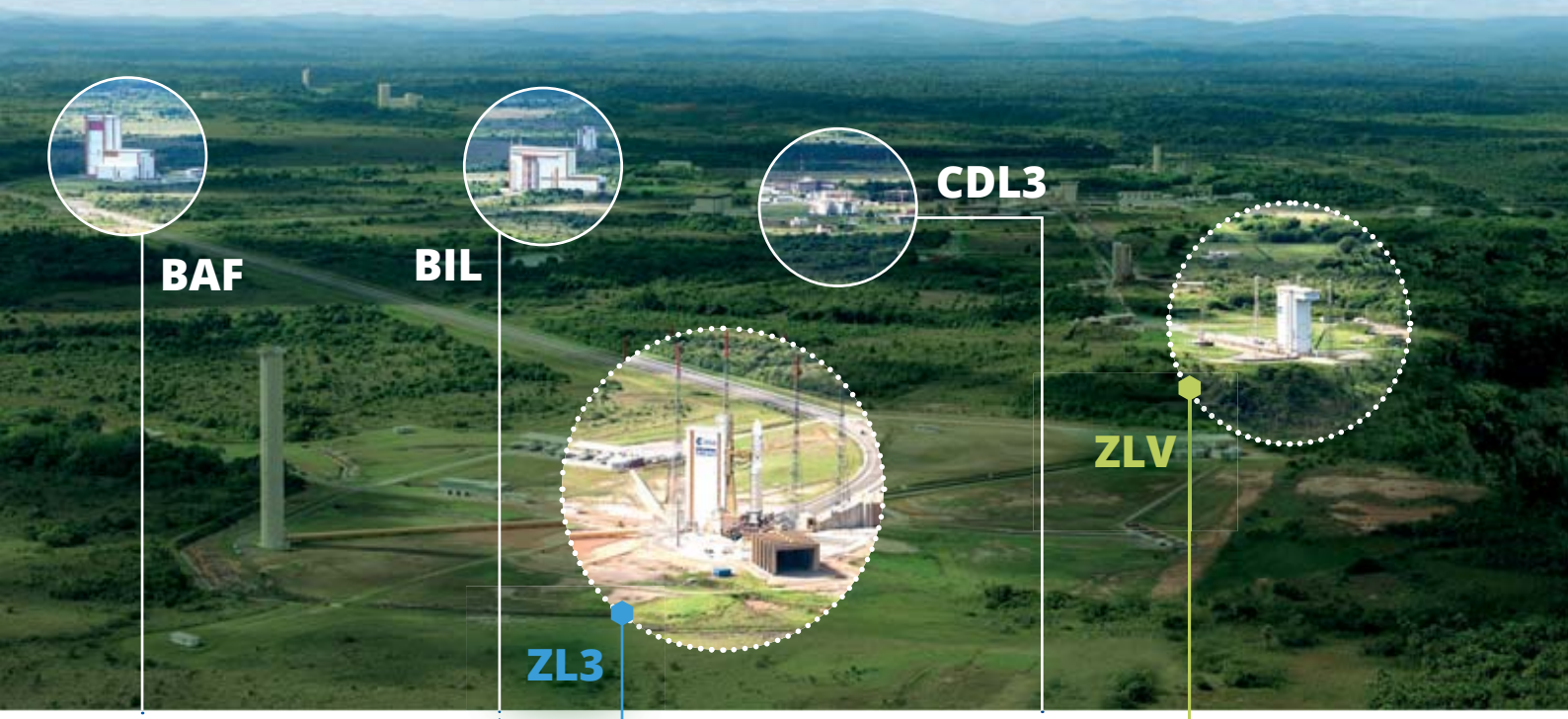
Perfectly versatile

The spaceport contains all required infrastructure and services to launch the Ariane 5, Soyuz and Vega rockets from a single operational site. It also provides three payload preparation facilities for customers' satellite teams. The Guiana Space Center is now ready to operate Arianespace's next generation of launchers: Ariane 6 and Vega C.

Ideally situated

The spaceport is close to the Equator at 5.3° North latitude. Launching near the Equator reduces the energy required to orbit. This saves fuel and allows larger payloads to be lofted, which dramatically improves return-on-investment for spacecraft operators.

The site is highly operational since it is outside both hurricane and earthquake zones.



ARIANE 5

Final Assembly Building
This is the last step before transfer to the launch zone on Day -1.

ARIANE 5

ARIANE 5
Launch Pad #3
Ariane 5's launch zone is where fueling and the final preparation operations take place prior to the final countdown and lift-off.

ARIANE 5

Launcher Integration Building
The launch campaign begins in this building, where Ariane 5's main stage boosters, cryogenic upper stage and the equipment case are assembled.

VEGA VEGA C

VEGA - VEGA C
Launch Pad
At Vega's integration and launch zone, the mobile gantry allows access to the launcher's stages during integration. The gantry is rolled back before lift-off.

Launch Control Centre #3
All operations for Ariane 5 and Vega launchers are overseen and monitored from the Launch Control Center through lift-off. It also will be utilized for Ariane 6.

Jupiter building

In the Jupiter building, a mission control center brings together CNES, ESA, Arianespace and satellite teams during countdown, lift-off and mission tracking. Customer guests of Arianespace, as well as local invitees can follow the mission from the Jupiter building's VIP seating area.

BAL

ZL4

CDLS

MIK

ZLS

ARIANE 6

Launcher Assembly Building
This facility is where the main and upper stages are assembled.

ARIANE 6

ARIANE 6
Launch Pad #4
The launch zone for Ariane 6 is where final integration operations are carried out with the use of a mobile gantry.

SOYUZ

SOYUZ
Launch Pad & MIK
The Soyuz launch complex is composed of the launch center, assembly building and launch pad. Its purpose-built mobile gantry enables payloads to be installed atop the Soyuz three-stage vehicle while in the vertical position.

1 km

A GLOBAL LEADER

We're proud to have become the preferred launch services provider for so many commercial operators and space agencies. Why? Here's what you've told us: you give us high marks for our outstanding delivery, dedicated launch teams, passionate experts and market-driven innovation.

Reliability

This single word connotes success in the launch services market. Arianespace has built its reputation with a family of three complementary and trustworthy launch vehicles. It includes **Ariane 5,** with a remarkable track record of 100+ consecutive missions accomplished. Arianespace is the best choice today for operators who want their payloads orbited with complete confidence.

Performance

The heavyweight champion, **Ariane 5,** launched a record 10,865 kg to GTO during a mission in 2017. But this is just one milestone in Arianespace's long line of successful deliveries. Over the past 40 years, we've injected more than 1,363 tons into orbit. Our lift capacity will continue to increase as **Ariane 6** and **Vega C** enter into service, providing the vehicles to continue to handle the large and sophisticated spacecraft that generate revenue for our customers.

Availability

Our cutting-edge infrastructure and expert teams at the Guiana Space Center lead multiple launch campaigns simultaneously with the highest level of reliability. This ensures we offer the launch schedule that fits your business plan and meets your deadline. And our launch cadence capability will significantly increase from late 2019-2020 thanks to faster turnaround at CSG with the **Ariane 6** and **Vega C** launchers.

Loyalty

Our focus is on your success. Arianespace has orbited more than 600 satellites for 90+ customers, many of which have been with us since the beginning. Arianespace has a long-standing commitment to offer the best service to each of our customers. We name a dedicated launch team for each mission and they partner with you during every step, from signing the contract, to providing technical advice and tuning the mission to your requirements, to celebrating the successful payload separation. Certain clients have launched their entire satellite fleet with Arianespace.

Teamwork

With four decades of collective experience, our teams have knowledge and expertise that are unparalleled in the industry. And they are ready to share that expertise with you. But beyond skill, our experts share a remarkable love of their craft and a passion for client service. Just participate in a launch in Kourou and you will see them cheering each new success with their customers and partners as if it were their first.

Innovation

We designed our next-generation **Ariane 6,** which will enter service in 2020, to respond to your needs for increasingly flexible and cost-effective launch options. This new system will cut costs and further improve orbital injection capabilities and satellite lifespans. The new **Vega C** will increase payload capability — including innovative rideshare possibilities — and reduce cost for the light-lift market.

ACTING RESPONSIBLY, ON EARTH AND IN SPACE

We are convinced that the future of Earth is entwined with that of space. Along with our clients, Arianespace uses this public resource to improve life on Earth: to provide more space to connect with each other, make life-changing discoveries, protect the Earth's people and care for the planet.

Sustainability and responsible development of both the Earth and space is an utmost priority. This is why Arianespace voluntarily commits to being an eco-responsible corporate citizen, a local economic catalyst and a caring employer.

ISO 14001
ARIANESPACE OBTAINED CERTIFICATION FOR **ITS ENVIRONMENTAL MANAGEMENT IN JULY 2014**

ISO 50001
ARIANESPACE OBTAINED CERTIFICATION FOR **ITS ENERGY PERFORMANCE IN DECEMBER 2014**

Our active engagement for the environment

Arianespace works to manage and reduce our environmental footprint. The ISO 14001 and ISO 50001 certifications obtained for our facilities in French Guiana are clear recognition of the company's efforts and results over recent years. ISO 14001 certification, for our environmental management system, covers all Arianespace launch vehicles and the construction and maintenance of our launch facilities. ISO 50001 certification applies to our overall energy management system.

We are also engaged in proactive purchasing and transport policies for all our activities, staff, our partners and suppliers. We choose to purchase from sustainable sources and suppliers. We have reduced the fuel consumption of our company vehicles; and we favor sea and river shipping for the delivery of launch vehicle components.

Arianespace is fully committed to protecting the natural sites around the Guiana Space Center. The local environment and biodiversity are at the heart of our efforts. Multiple studies and reports confirm that locally, our operations have minimal environmental impact. Air and water are tested after each launch as part of our ongoing environmental management. Impact of the launches on the coastline, marine wildlife, flora and birds is evaluated twice each year.

We pay special attention to the preservation of one of the area's most typical birds: the scarlet ibis.

Our eco-responsible approach continues once the rocket is off the launch pad, as we manage our launch vehicles' stages and components that reach orbit in a sustainable way.

We have employed a single management system, integrating both energy and the environment, since February 2018.

Doing our part for local development

In French Guiana, Arianespace's activities generate 4,600 direct and indirect jobs. The space industry corresponds to 17% of the local private-sector payroll. We also contribute to educational, cultural and sports programs.

Arianespace offers scholarships while also sponsoring two local sports clubs and events, such as Guiana's Robotic Cup, to develop scientific passion among young people.

A socially committed employer

Delivering an outstanding level of service consistently requires world-class skills and unwavering commitment and drive from our employees. In a demanding industry, Arianespace's human resources development plan and overall HR policy are distinctive

assets to secure our long-term competitiveness.

We are highly committed to offering training and career development opportunities to all employees. We plan ahead, by ensuring our people's abilities and skills are in line with Arianespace's requirements today and well into the foreseeable future.

We focus on positive employee relations and wage equality. We monitor workplace well-being and take corrective action when required. Today, no less than 15 company-wide agreements embedding these principles into our corporate processes and culture are being implemented.

+98%

OF ARIANESPACE'S WORK FORCE IS OFFERED **AN ANNUAL PERFORMANCE REVIEW.**

10

NATIONALITIES ARE REPRESENTED **IN ARIANESPACE'S WORK FORCE.**

Promoting diversity and equal opportunity

Arianespace is implementing a policy that encourages diversity and dismisses discrimination. Since 2009, several company-wide agreements were formalized to guarantee gender equality in our recruitment processes. We also make sure the career evolution for women remains compatible with parenthood and we support wage equality between men and women.

Arianespace considers workforce diversity as an asset to the company. This is why we encourage the recruitment of employees from a wide variety of nationalities. Equal opportunity is also a guiding principle in all our human resources processes.

A GLOBAL LEADER IN LAUNCH SERVICES

Arianespace since 1980

arianespace
arianeGROUP

Since
1980

600+
SATELLITES
orbited to date

3
LAUNCH VEHICLES

2
ADDITIONAL LAUNCHERS
nearing deployment

200+
EMPLOYEES

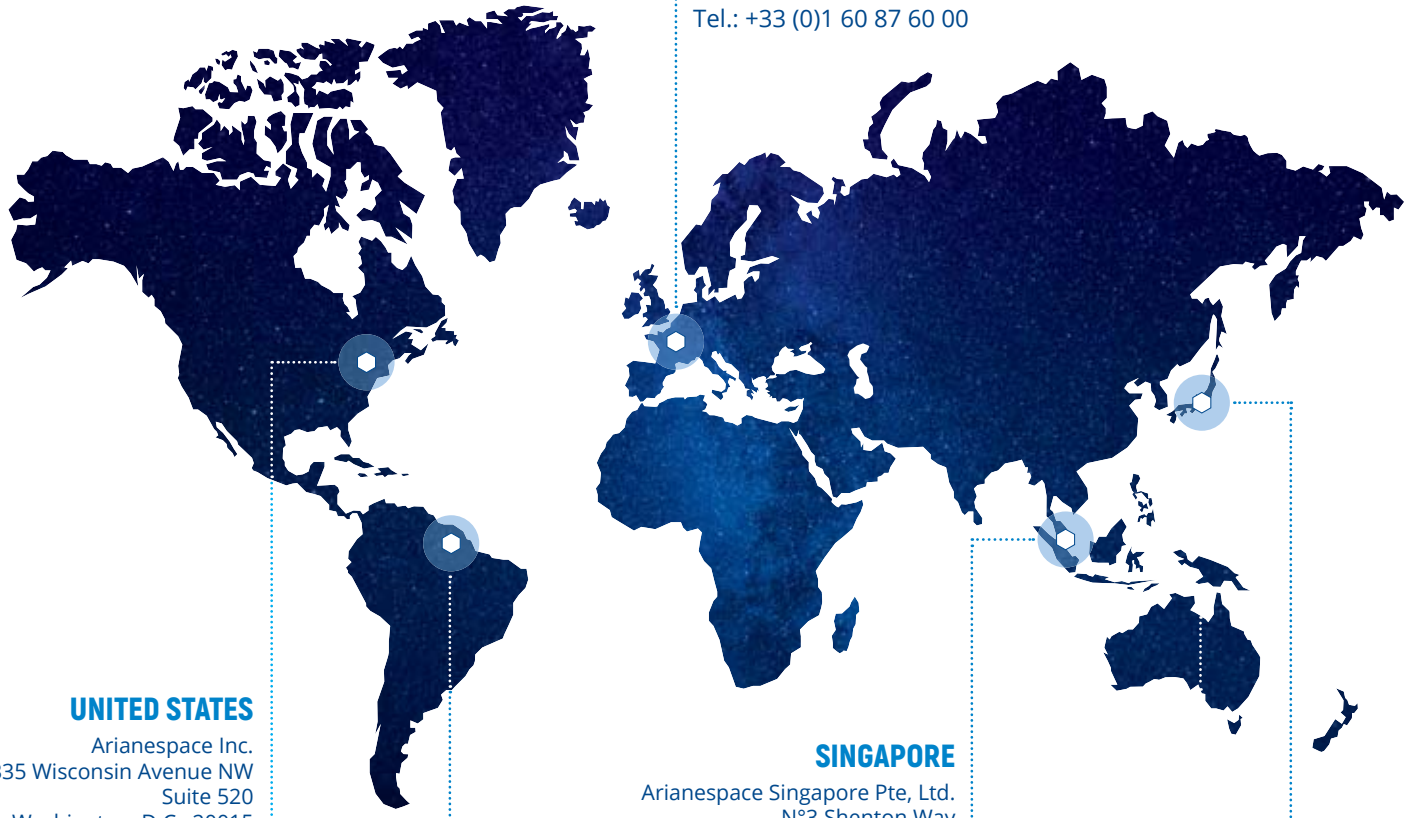
100+
CUSTOMERS

74%
ARIANESPACE IS A SUBSIDIARY OF ARIANEGROUP, WHICH HOLDS NEARLY 74% OF ITS SHARED CAPITAL

16
shareholders, representing the entire European space industry

2
censors: ESA and CNES

STRONG PRESENCE WORLDWIDE



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Ariane 6 and Vega C (page 12): Arianespace, MIP; Ariane 6 (page 14): ArianeGroup; Vega C (page 15): Arianespace, Jacky HUART.

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