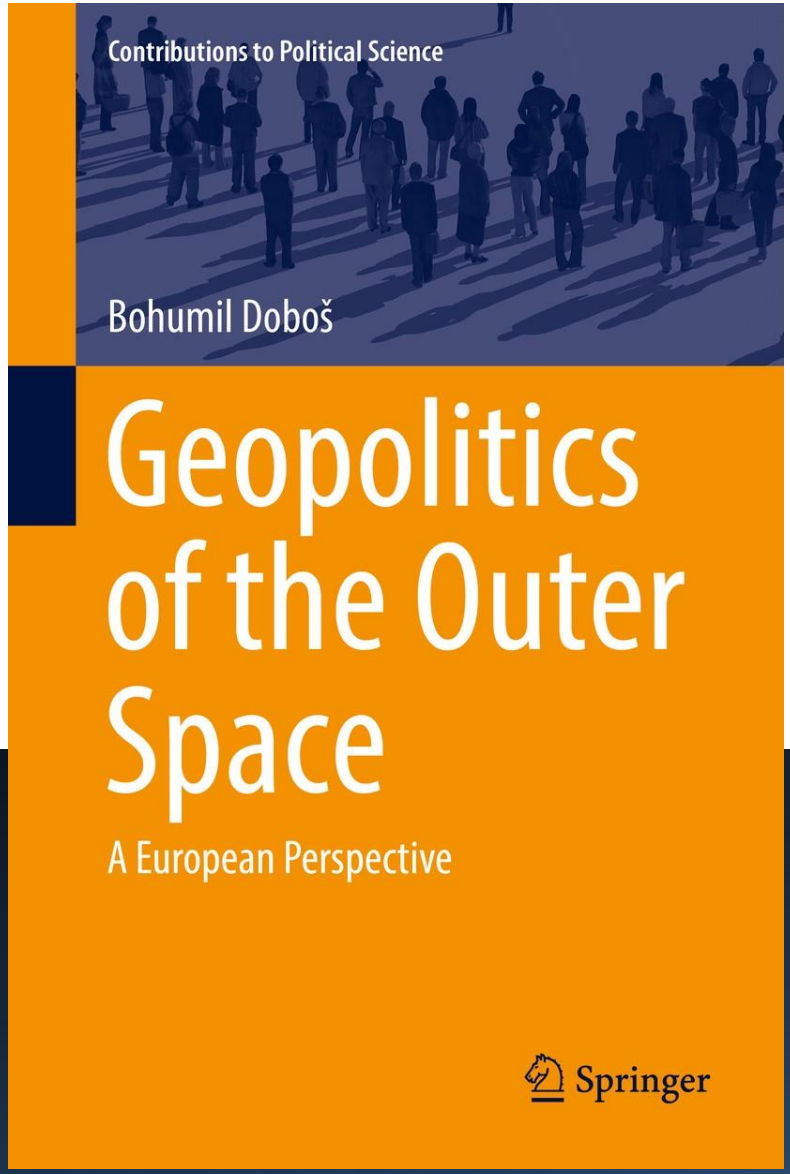
The History of the European Space Program

Based on: Geopolitics of the Outer Space – A European Perspective (Chapter 5)



FROM THE BIG BANG TO GREAT POWERS: SCIENCE AND GEOPOLITICS

Learning Objectives & Structure

- **Explain** how post-war Europe and the Cold War shaped a common space vision.
- **Assess** the role of space cooperation in European integration.
- **Discuss** how innovation supported *strategic autonomy* and *soft power*.
- **Evaluate** Europe's shift from science to geopolitics and sustainability.

Part I — Origins & Early Cooperation (1950 - 1975)

- Post–WWII Europe, Cold War context
- Early national initiatives and the birth of ELDO & ESRO

Part II — ESA and European Integration (1975 - 1990s)

- Foundation of the European Space Agency (ESA)
- Space as a symbol of unity, identity, and technological excellence

Part III — Strategic Autonomy & Global Leadership (1990 - 2025)

- Galileo, Copernicus, and the rise of the European space economy
- From cooperation to strategic power and sustainability

Europe After 1945: Division and Reconstruction

Post-war Europe: ruined, divided, and reliant on U.S. support.

- **Cold War** split Europe into capitalist West and communist East.
- **Marshall Plan (1948):** boosted recovery, reinforced U.S. influence.
- **Warsaw Pact (1955):** secured Soviet control in the East.

Between two blocs, Europe sought **unity, autonomy, and influence** through economic and scientific cooperation.

Space as a Symbol of Power

- During the **Cold War**, space became the ultimate display of prestige and technological superiority.
- The **Space Race** (USA vs. USSR) symbolized an *ideological* battle between capitalism and communism.
- Satellites, manned missions, and lunar landings showcased *political power and modernity*.
- Post-war Europe aimed to join the *space age* while keeping *strategic neutrality* between the two blocs.

In the geopolitics of the Cold War, space was not just above nations — it was a stage on which nations proved who they were.

Europe's Position in the Cold War Order

- Europe was caught **between two superpowers**, reliant on the U.S. for security but wary of dependence.
- **NATO** provided defense, yet countries like **France** pursued *strategic and technological autonomy*.
- The idea of **independence through science and technology** grew as a path beyond U.S.–Soviet rivalry.
- Space cooperation became a **peaceful assertion of sovereignty**, reflecting Europe's unity goals.

 *Europe's autonomy began not on the battlefield, but in the labs and launch pads of science.*

European Integration Framework

- After 1950, European integration began as a **peace project** — preventing future wars through cooperation.
- The **ECSC (1951)** and **EEC (1957)** promoted *shared sovereignty* and mutual benefit.
- **Science and technology** became tools of unity:
  - **CERN (1954)** fostered joint research in nuclear physics https://home.cern/about/who-we-are/our-history
  - **EURATOM (1957)** coordinated nuclear energy development under civilian control https://www.europarl.europa.eu/about-parliament/en/in-the-past/the-parliament-and-the-treaties/euratom-treaty
- These models proved that **collective investment in research** could strengthen Europe's global standing — a lesson soon applied to the **European Space Program**.

Science Diplomacy in Europe

- After WWII, **scientific collaboration** became a key diplomatic tool to rebuild trust in a divided Europe.
- **CERN** and **EURATOM** showed that shared research could bridge political divides and enhance Europe's prestige.
- This **science diplomacy** — cooperation through knowledge, not power — let Europe **influence beyond military and economic means**.
- **Space exploration** emerged as a new arena for peaceful, transnational collaboration.

Europe's scientists became its quiet diplomats — showing that collaboration in laboratories could achieve what politicians could not at negotiation tables.

The Space Frontier as a Geopolitical Arena

- During the Cold War, **space became the new arena of global rivalry**, symbolizing power and progress.
- **Sputnik (1957)** and the **Apollo missions (1960s)** turned space into a measure of prestige and credibility.
- Superpowers used space to prove **technological superiority** and **ideological dominance**.
- For Europe, space was both an **opportunity for relevance** and a **strategic need** for independence.
- Europe sought to **influence through cooperation**, carving a "third path" between the U.S. and USSR.

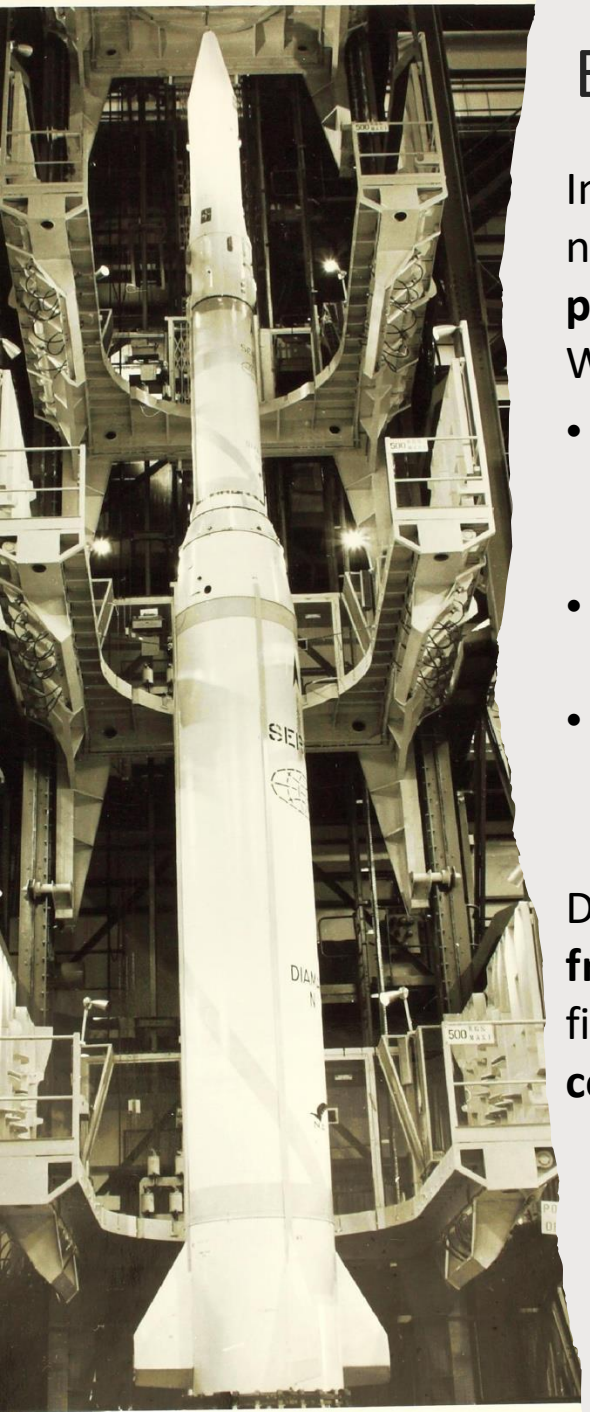
📍 *In the Cold War, space wasn't just about exploration — it was about shaping Earth's future.*

https://youtu.be/oWR70ngPYbc?si=CabxHE1gvRFh5Va1
https://youtu.be/hzApsIPHRwo?si=W58uAdtX8Q-xjNN5

Founding Visionaries

- In the 1950s–60s, leaders like **Charles de Gaulle** and **Harold Macmillan** promoted a **technologically independent Europe**.
- De Gaulle viewed space and nuclear power as tools of **strategic sovereignty**.
- Macmillan believed Europe must **cooperate scientifically** to stay relevant in a bipolar world.
- Early programs in France, the UK, Germany, and Italy reflected **prestige politics**, where space symbolized modernity and pride.
- These national ambitions evolved into a **collective European vision**, paving the way for ESRO and ELDO.

Europe's space dream began with leaders who saw technology as power.



Early National Initiatives

In the late 1950s–60s, European nations launched **independent space programs** driven by ambition and Cold War prestige.

- **France** developed the *Diamant* launcher — the first European satellite in orbit (*Astérix*, 1965).
- **UK** pursued *Blue Streak*, a missile later adapted for civilian use.
- **Germany and Italy** worked on small satellites and joint projects with the U.S. and NATO.

Despite success, programs were **fragmented and costly**, leading to the first steps toward **European coordination in space research**.

Fragmented efforts showed Europe needed unity to compete globally.

ELDO & ESRO: Two Parallel Paths

- In the 1960s, Europe created two key organizations to coordinate space efforts:
  - **ELDO (1962):** focused on developing a European launch vehicle (*Blue Streak*).
  - **ESRO (1964):** conducted scientific research and built satellites.
- Both showed Europe's **determination to compete globally**, pooling resources and expertise.
- Yet, they faced **technical issues, cost overruns, and political rivalries** between members.
- Despite challenges, they **laid the foundation** for the future **European Space Agency (ESA)** in 1975.

📍 *ELDO and ESRO proved that cooperation in science could overcome national rivalry*

Political Challenges

- Despite early enthusiasm, **national rivalries and diverging priorities** soon undermined cooperation within ELDO and ESRO.
- Member states disagreed on **how to share costs, distribute contracts, and select technological leadership** — each defending its own industrial interests.
  - **UK:** focused on cost and military use.
  - **France:** pushed for full autonomy.
  - **Germany:** emphasized scientific cooperation.
- The lack of a **unified industrial policy** led to overlaps and inefficiency.

Success in space required not just expertise — but political will.

Scientific Successes of ESRO

- Despite challenges, **ESRO achieved major scientific milestones** that built Europe's credibility in space.
- Key missions:
  - **ESRO-2B (1968):** cosmic rays & solar radiation.
  - **HEOS-A (1968):** Earth's magnetosphere & solar wind data.
  - **TD-1A (1972):** ultraviolet sky mapping.
- Proved Europe's ability to **design, launch, and operate satellites collectively**.
- Built a strong network of scientists and engineers, **laying the groundwork for ESA**.

ESRO showed that science could unite Europe — one satellite at a time.

- France launched **Diamant** on **26 November 1965**, placing *Astérix* — Europe's **first satellite** — into orbit.
- The **first fully European-designed launcher**, marking Europe's entry into space.
- A **symbol of French determination and strategic independence**, aligned with De Gaulle's vision of autonomy.
- Though small in capacity, it **proved Europe's potential** to develop its own launch systems — paving the way for **Ariane**.

Diamant was more than a rocket — it was a statement: Europe could reach space on its own terms.
https://youtu.be/Gz7SVwC8AMI?si=gVzQ6q5NzOsQ2jYt

- Began as a **British missile program** for nuclear deterrence.
- Later **repurposed for space**, forming the core of **ELDO's launcher** with France and Germany.
- Technically advanced but **too costly and politically divided** — cancelled in **1971**

Blue Streak's failure marked the end of Europe's national rocket rivalries — and the beginning of a truly cooperative approach.

https://youtu.be/Ne8shDmcd5g?si=W1qMqHr_fF-LTU0f

Lessons Learned from Fragmentation

- By the 1970s, Europe saw that **national space programs were inefficient** and **unsustainable**.
- Rivalries led to **duplication, waste, and slow progress**.
- Failures like **Blue Streak** and limits of **ELDO/ESRO** proved the need for **a unified framework**.
- **Economic realism** pushed nations to **pool resources and cooperate**.
- Shift from competition to **integration through science**.

 *Fragmentation taught Europe a vital lesson: to reach space, it first had to build unity on Earth.*

Transition Toward a Unified Agency

- In the early 1970s, Europe decided to **merge ELDO and ESRO** into one institution — the **European Space Agency (ESA)**.
- The **1973 Brussels Space Conference** set a shared vision for governance and funding.
- The **"juste retour" principle** ensured fairness — contracts proportional to each country's contribution.
- The **ESA Convention (1975)** formalized Europe's unity in science, technology, and space.

📍 *ESA united Europe's scientific ambition with political cooperation.*

European Identity through Science

- By the 1970s, **science and technology** had become core elements of Europe's emerging identity, showing that integration could bring real progress.
- The **European Space Program** turned unity into practice — scientists, engineers, and policymakers from different nations worked together toward a common goal.
- Space became part of a **shared European narrative**, promoting cooperation, innovation, and peaceful exploration rather than rivalry.
- During the **Cold War**, this scientific unity symbolized Europe's **distinct geopolitical stance** — a *"third way"* between the American and Soviet models of power.
- Through ESA and other projects, Europe projected an image of **soft power, diplomacy, and technological leadership**, reinforcing its collective identity on the global stage.

 *Science became Europe's language of unity — a bridge between technology and diplomacy.*

Timeline 1950s–1975

Key Milestones in Europe's Path to Space Cooperation

- **1959 – UK Blue Streak:** The United Kingdom's ballistic missile project later became part of ELDO's launcher development efforts.
- **1962–1964 – ELDO and ESRO founded:** Two parallel organizations created to coordinate launcher development and space science missions.
- **1965 – France launches *Astérix* satellite:** Using the *Diamant* rocket, France becomes the first European nation to reach orbit.
- **1973 – Ariane program approved:** A new generation of European launchers proposed under the "European Space Conference," marking a decisive step toward autonomy.
- **1975 – ESA established:** Merger of ELDO and ESRO forms the **European Space Agency**, creating a unified institution for Europe's space future.

From rivalry to unity: 15 years of cooperation transformed Europe from fragmented national programs into a collective space power.

Birth of ESA (1975)

- In **1975**, Europe merged **ELDO** (launchers) and **ESRO** (science) to form the **European Space Agency (ESA)**.
- For the first time, Europe spoke with **one institutional voice** in space affairs.
- ESA's **mission**: to secure **independent access to space** for research and commercial use.
- Its structure balanced **shared governance and collective funding** through the *juste retour* principle — fairness between contributors and benefits.
- ESA soon became a **symbol of European unity through science**, aligning with Europe's broader goals of integration, autonomy, and technological leadership.

📍 *ESA's creation marked Europe's transformation from fragmented efforts to a unified space power.*

ESA's Founding Principles

- ESA was built on the idea of **"One Europe in Space"**, transcending national boundaries.
- Core principles:
  - **Flexible membership** – open to non-EU states.
  - **Shared costs & collective decisions** – ensuring balance and fairness.
  - **Peaceful use of space** – aligned with the **UN Outer Space Treaty (1967)**.
- ESA became a **bridge between science, technology, and diplomacy**, proving that cooperation could unite rather than divide.
- These principles still define ESA's **success and legitimacy** today.

 *ESA was Europe's peaceful response to the Cold War — showing that unity could achieve what rivalry could not.*

Ariane Program Begins

- The **Ariane program** was launched in **1973** to secure Europe's **independent access to space**.
- Built after earlier launcher failures, it showed Europe's resolve to **control its own launch capability**.
- Led by **France's CNES**, Ariane became a model of **European collaboration**, joining industries from many member states.
- The **first launch in 1979** from French Guiana was both a **technical success** and a **symbol of autonomy** — Europe could now reach orbit without U.S. or Soviet support.
- Ariane evolved into one of the world's **most reliable launcher families**, strengthening Europe's **global presence**.

📍 *Ariane turned Europe's vision of autonomy into reality — a rocket that carried both satellites and sovereignty.*

Arianespace: Europe Goes Commercial

In **1980**, Europe created **Arianespace**, the world's first **commercial launch service company**, to operate and market the Ariane family of rockets.

- It marked a new **public–private partnership**, linking ESA's research with industrial and commercial expertise.
- Based in **Évry, France**, Arianespace managed launches from **French Guiana**.
- The model helped Europe **compete globally**, offering reliable and cost-effective launch services.
- By the 1990s, Arianespace became a **leader in satellite launches**, proving that space could be both scientific and profitable.

📍 *Arianespace turned European space policy into a sustainable business — blending sovereignty with profitability.*

European Satellite Revolution

- From the **late 1970s to 1980s**, Europe launched pioneering **satellite programs** showing growing technological strength.
  - **Meteosat (1977):** Europe's first weather satellite — foundation of EUMETSAT.
  - **ECS (1978):** Boosted Europe's role in **telecommunications** and broadcasting.
  - **Marecs (1981):** Supported **maritime navigation** and emergency communications.
- These missions proved Europe's **capacity for strategic, civilian space services** — improving safety, communication, and monitoring.
- They also strengthened ESA's **global reputation** beyond a regional role.

Europe's satellites turned scientific innovation into strategic influence.

Space Infrastructure

- ESA built a **network of strategic centers** across Europe, each focusing on a key space function:
  - **ESTEC (Netherlands):** Spacecraft design, testing, and engineering.
  - **ESRIN (Italy):** Earth observation and environmental data.
  - **ESOC (Germany):** Satellite control and mission operations.

- Together, these form the **backbone of Europe's space capability**, linking design, data, and operations under one cooperative system.
- This distributed model embodies the **principle of European balance** — scientific excellence shared among nations.

Europe's space strength lies in unity through specialization.

Scientific Achievements

Giotto, Hipparcos, and Spacelab

- ESA's scientific missions in the 1980s and 1990s **solidified Europe's reputation as a leader in space research**.
  - **Giotto (1986):** First European deep-space mission — approached **Halley's Comet**, capturing close-up images.
  - **Hipparcos (1989–1993):** First **astrometry** mission — mapped over **100,000 stars**, revolutionizing astronomy.
  - **Spacelab (1983–1998):** ESA-built lab flown on **NASA's Shuttle**, enabling microgravity and life sciences research.
- These projects proved Europe's **scientific and diplomatic excellence**, blending autonomy with cooperation.

 *Europe reached deep space — and global respect — through collaboration and precision.*

ESA–NASA Relations

The **ESA–NASA partnership** stands as one of the most successful examples of transatlantic scientific diplomacy.

- **Spacelab (1983–1998):** Built by ESA, flown on NASA's Shuttle — symbol of **mutual trust** and **shared excellence**.
- European astronauts like **Ulf Merbold** and **Claude Nicollier** joined Shuttle missions, marking a milestone in human spaceflight.
- The collaboration showed Europe's **unique expertise** and ability to **work as an equal partner** in major missions.
- It also raised ESA's **international prestige and visibility**, proving Europe's reliability in global space exploration.

📍 *ESA and NASA turned competition into collaboration — bridging science and diplomacy across the Atlantic.*

Claude Nicollier (born 2 September 1944)

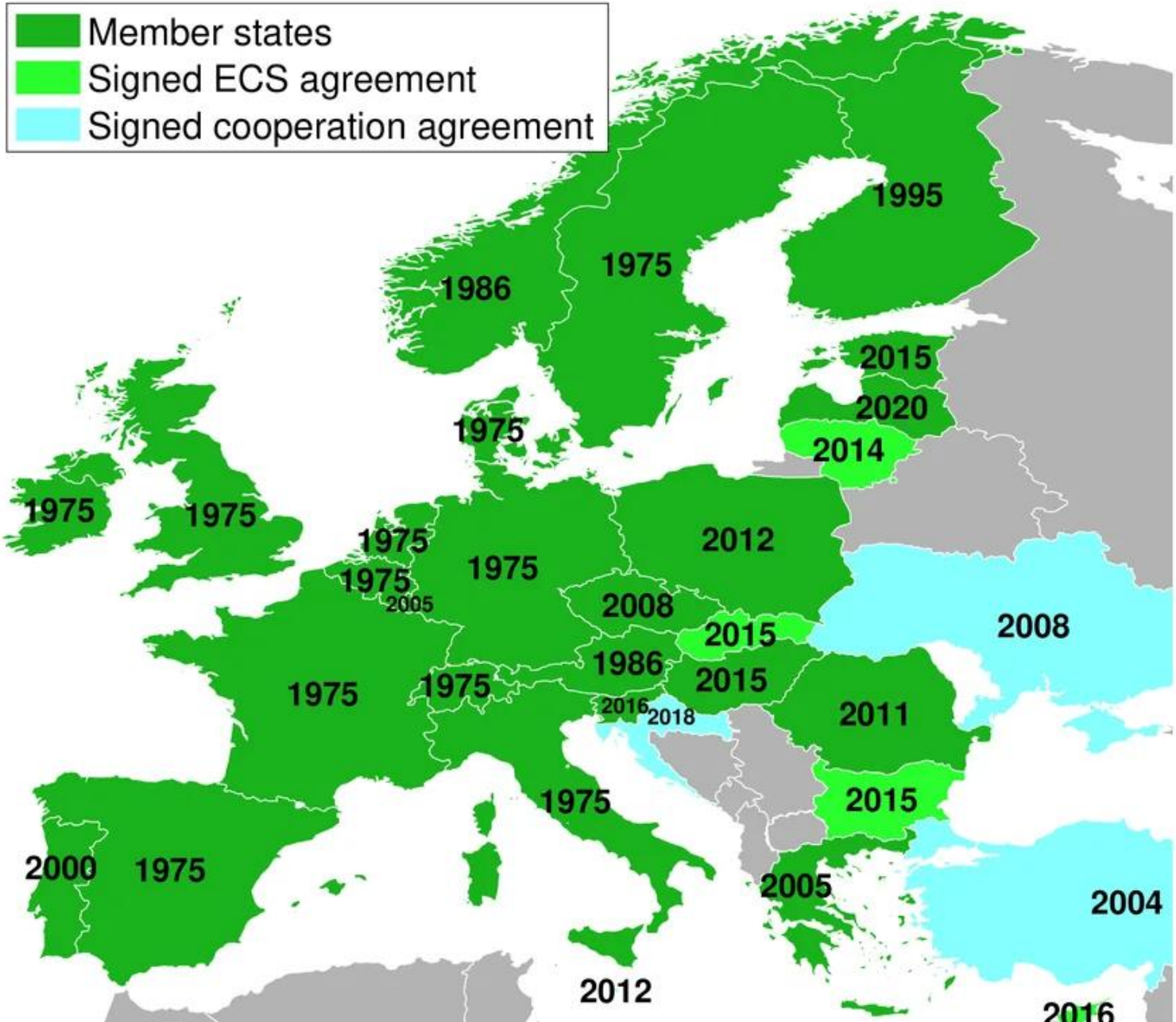
Ulf Dietrich Merbold (born 20 June 1941)

Political Significance

- ESA's creation marked a **new form of European integration** — uniting EU and non-EU nations through science and progress.
- It became a **symbol of functional integration**, achieving unity via cooperation, not treaties.
- Shared resources and benefits **strengthened Europe's collective influence** in global affairs.
- ESA advanced Europe's **technological diplomacy**, using space as a platform for international engagement.
- Its success proved Europe could act as a **cohesive and innovative global actor**, beyond politics.

ESA showed that Europe's power could be built on science, not sovereignty.

Member states of ESA by year of joining



Post-Cold War Context

- The 1990s reshaped global space activity after the **Cold War's end**.
- The **bipolar rivalry** gave way to a **globalized, commercialized** space landscape.
- **New actors** — private firms, emerging economies, and consortia — brought competition and innovation.
- Focus shifted from ideology to **market value, data services, and applications**.
- Europe **adapted its strategy**, linking science with business and competitiveness.
- A new paradigm emerged: the **space economy**, merging technology, policy, and profit.

 *Space became less about blocs — and more about partnerships, profits, and planetary goals.*

- **Launched in the 2000s**, Europe's first **global navigation system** ensured **strategic and technological autonomy**.
- A **joint EU–ESA project**, Galileo offers a **civilian alternative** to U.S. GPS and Russia's GLONASS.
- Built on **transparency, accessibility, and cooperation**, not military control.
- Provides **precise positioning and timing** for aviation, transport, telecoms, and defense.
- Became a **symbol of European sovereignty** — showing Europe can lead in space technology.

https://youtu.be/JaudGwe34Ro?si=q9fBj3cdkOR66wo1

Galileo is Europe's compass in space — a project that turned autonomy into orbit

Today, Galileo serves over two billion users worldwide, strengthening Europe's role in the global space economy and digital infrastructure.

Copernicus
Global Monitoring for Environment and Security

- Europe's **flagship Earth observation program**, run by the **EU and ESA**.
- Uses **Sentinel satellites** to monitor land, oceans, and atmosphere in real time.
- Supports **climate action, disaster response, and sustainable agriculture**, feeding into the **Green Deal** and **Climate Law**.
- Promotes **open data**, **scientific innovation**, and **global cooperation**.
- Embodies Europe's belief that **space serves people and the planet**, not profit or power.

Copernicus shows how Europe uses space for sustainability and security.

https://youtu.be/NcPNhlP4PsY?si=UAlvaNnU-pDqpF4e

ISS Collaboration

Europe became a key partner in the **International Space Station (ISS)** — one of the most ambitious cooperative projects in human history.

- ESA's main contributions:
  - **Columbus Laboratory (2008):** Europe's research hub for microgravity, biology, and materials science.
  - **Automated Transfer Vehicle (ATV):** Cargo and fuel deliveries (2008–2015).
- Partners include **NASA**, **Roscosmos**, **JAXA**, and **CSA**.
- The ISS embodies **science diplomacy** and **soft power**, showing how shared goals unite nations.
- Europe is now a **trusted global partner** in human space exploration.

The ISS proves that space can bridge divides on Earth.

Rosetta & Philae Mission

- **Launched in 2004**, one of ESA's most ambitious missions.
- After a **10-year journey**, Rosetta reached **Comet 67P** in **2014**.
- Its lander **Philae** achieved the **first-ever landing on a comet**, a major milestone in space history.
- Revealed key insights into the **composition of comets** and the **origins of water and organic molecules** on Earth.

Beyond its scientific triumph, Rosetta showcased **European engineering excellence, perseverance, and creativity** — qualities that captured global attention and admiration.

📌 The mission remains a **symbol of Europe's capacity for leadership in deep-space exploration** and of the power of long-term scientific vision.
https://www.esa.int/ESA_Multimedia/Videos/2014/10/Ambition_the_film
https://youtu.be/kFx_fADBbc0?si=6OzZHRL3y3BB9-qJ

Climate and Sustainability Policies

- The **EU and ESA** have integrated **space policy** into broader **sustainability goals**.
- **Copernicus** data supports monitoring of **climate change, deforestation, pollution, and ocean health**.
- These insights feed into the **European Green Deal**, **Paris Agreement**, and **UN SDGs**.
- Space data enables **evidence-based policymaking**, helping predict disasters and manage resources.
- Europe shows that **space technology** can serve **ecological responsibility**, not just power or profit.

ESA and the EU are now global leaders in "space for sustainability."

The Moon Village Vision

- Proposed by **ESA's Director Johann-Dietrich Wörner** in the mid-2010s.
- Envisions a **permanent, cooperative base on the Moon** shared by nations and private actors.
- Serves as a **framework for global collaboration**, uniting diverse missions under one vision.
- Promotes **shared infrastructure**, **scientific openness**, and **sustainable exploration**.
- Aims to make the Moon a platform for **research**, **resource use**, and **innovation**.
- Reflects ESA's philosophy of **"cooperation over competition"**, strengthening Europe's bridge-building role in space.

The Moon Village turns Europe's ideals of unity and peace into a blueprint for space exploration.

Emergence of Private Sector

- Europe has seen the **rise of private space companies** complementing or challenging ESA's role.
- Key players: **Airbus**, **OHB (Germany)**, **Avio (Italy)**, and new **start-ups** (e.g., Isar Aerospace, Rocket Factory Augsburg, PLD Space).
- Focus areas: **small satellites**, **launchers**, **Earth observation**, and **in-orbit services**.
- Reflects a **global shift toward commercialization and innovation** — Europe's answer to the U.S. "New Space" movement.
- Supported by **CASSINI Space Entrepreneurship**, **EUSPA**, and **Horizon Europe**.
- Marks a **new era of competitiveness and strategic autonomy** for Europe in the global space economy.

Europe's space ecosystem now blends public leadership with private agility.

EU Space Policy & Strategic Autonomy

- The **Treaty of Lisbon (2009)** recognized **space as an EU competence**, allowing the Union to develop its own **space policy**.
- The **2016 EU Space Strategy** set four pillars:
  - **Access & autonomy** – reduce reliance on non-European systems.
  - **Competitiveness & innovation** – boost Europe's role in the global space market.
  - **Security & defense** – strengthen dual-use and satellite technologies.
  - **Sustainability & societal benefits** – support climate and disaster monitoring.
- The goal of **strategic autonomy**: ensure Europe acts independently in key space domains.
- New programs like **IRIS² (secure connectivity)** and the upcoming **EU Space Law** enhance Europe's **technological and geopolitical sovereignty**.

 *Europe aims to lead in space through independence, innovation, and shared governance.*

ESA–EU Relationship

- The **ESA (1975)** and the **EU** are **distinct entities** with different governance systems.
- **ESA** focuses on **scientific research and technological innovation**, while the **EU** sees space as a tool for **security, economy, and sustainability**.
- Their cooperation has grown through **shared programs** like **Galileo** and **Copernicus**, blending ESA's technical expertise with EU political leadership.
- Since the **2004 Framework Agreement**, coordination structures like the **EU–ESA Joint Secretariat** and **EUSPA** ensure alignment.
- This partnership reflects a **"European model"** — merging scientific excellence with political vision.

 *ESA and the EU together turn space into both a scientific and geopolitical asset for Europe.*

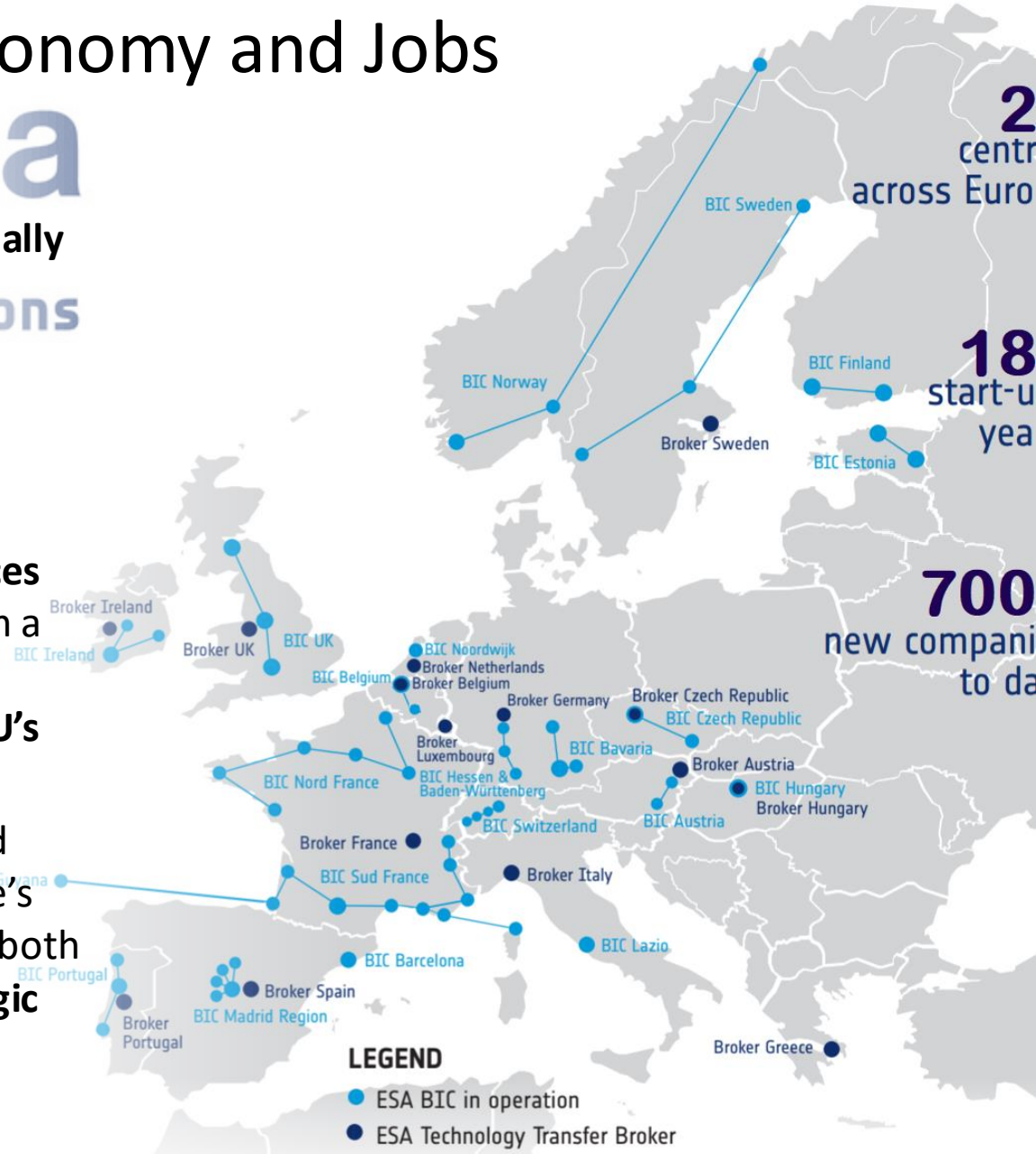
Security and Defence Dimensions

- The **EU and ESA** now emphasize the **security and defence** aspects of space.
- **Space Situational Awareness (SSA)** ensures Europe can **track debris, detect threats,** and **protect satellites**.
- Evolved into **"Space Security Awareness (SSA 2.0)"**, tackling **cybersecurity**, **satellite jamming**, and **geopolitical risks**.
- Europe invests in **dual-use technologies** — secure communications, autonomous navigation, and Earth observation — for both **civil and defence** use.
- Programs like **IRIS²** and **GovSatCom** aim to strengthen **space sovereignty** and **operational resilience**.

📍 *Space has become a new frontier for Europe's security, resilience, and technological autonomy.*

Space Economy and Jobs

- The **European space economy** employs **230,000+ people** and contributes **over €70 billion annually** to the EU's GDP.
- It now drives growth in **telecommunications, navigation, climate monitoring, and urban planning**.
- **Start-ups** and **downstream services** (satellite-based applications) form a dynamic innovation ecosystem, supported by **ESA BICs** and the **EU's CASSINI initiative**.
- Combining **public investment** and **private entrepreneurship**, Europe's "**New Space**" sector has become both an **economic engine** and a **strategic asset**.



Space is now a source of innovation, jobs, and sovereignty for Europe's future economy

Geopolitical Partnerships

- Europe's space diplomacy mirrors its **foreign policy** — **multilateral, cooperative, and rule-based**.
- Strong ties with the **U.S. (NASA–ESA)** and **Japan (JAXA, ISS)** are built on **trust and scientific exchange**.
- Relations with **Russia and China** remain **cautious**, shaped by shifting geopolitical realities.
- The EU and ESA promote a **"rules-based space order"** — peaceful use, non-weaponization, and shared benefit (per the **Outer Space Treaty, 1967**).
- Europe acts as a **mediator and norm-shaper** in global space governance.

 *Europe's strength in space lies in diplomacy, openness, and cooperation — not confrontation.*

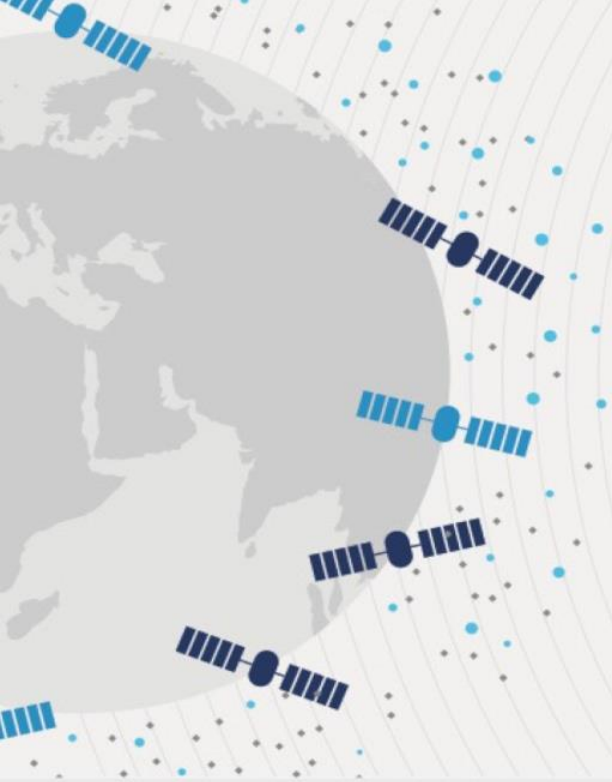
Ethics and Regulation

- Europe leads as a **global advocate** for **responsible and sustainable space governance**.
- Through **ESA's Clean Space Initiative** and **EU Space Law**, it promotes **debris mitigation, lifecycle management, and sustainable exploration**.
- Supports "**green satellites**" — recyclable and low-waste designs.
- Guides global talks on **space traffic, on-orbit servicing,** and **deorbiting policies**.
- Rooted in the idea that **outer space is a shared global commons**, requiring **fair access** and **environmental protection**.
- Links **technology, law, and ethics**, making space governance **accountable and fair**.

📍 *Europe aims to make space sustainable — protecting both orbit and opportunity.*

clean space

Save the orbits NOW!



Number of debris objects in orbit:

Over 10 cm → **34 000**

From 1 cm to 10 cm → **900 000**

A 10 cm object can cause a catastrophic collision

A 1 cm object can strike a satellite with the force of an exploding hand grenade

Today's annual launch rates: **nearly 100**

Doubling the number of objects will increase the collision risk by approx. **4 times**

Asset damages and service outagtes caused by collisions and collision avoidance manoeuvres in low Earth orbit will cost **€1.5 bln** to the European industry until 2040

To stop creating debris, experts urge the space sector to:

1. Minimise the production of debris by developing missions compliant with the Space Debris Mitigation (SDM) requirements

2. Remove five of the highest risk objects per year

Timeline 1990–2025

- **2003 – Galileo Launch:**
  Start of Europe's autonomous satellite navigation program, marking a milestone in strategic independence from U.S. GPS.
- **2008 – Columbus Laboratory (ISS):**
  Europe's permanent human presence in orbit; a symbol of scientific diplomacy and multinational collaboration.
- **2014 – Rosetta and Philae Mission:**
  First-ever landing on a comet; a triumph of European engineering and a statement of global leadership in deep-space exploration.
- **2020s – Moon Village & Artemis Collaboration:**
  ESA joins NASA's **Artemis Program**, providing modules and technologies for lunar missions while developing its **"Moon Village"** vision of sustainable, cooperative exploration.
- **2025 and Beyond – Green and Secure Space:**
  Europe focuses on **sustainable space operations**, **space traffic management**, and **secure connectivity** (IRIS^2), blending innovation with ethical and strategic governance.

Key Milestones Recap

- **1964 – ELDO & ESRO founded:**
  The first steps toward European space cooperation — ELDO focused on launchers, ESRO on science.
- **1975 – European Space Agency (ESA) established:**
  Merger of ELDO and ESRO, creating a unified European body for space exploration and research.
- **1979 – Ariane 1 launch:**
  Europe's first successful launcher, ensuring independent access to space and marking a turning point in global competitiveness.
- **2003 – Galileo Program initiated:**
  Beginning of Europe's autonomous satellite navigation system, asserting strategic and technological sovereignty.
- **2014 – Rosetta and Philae Mission:**
  The first-ever comet landing — symbol of Europe's engineering excellence and ambition in deep-space exploration.
- **2020s – Moon Village & Artemis Collaboration:**
  A new era of cooperative lunar exploration and global partnerships — Europe shaping the future of sustainable space governance.

Europe's Space Geopolitics Today

- Europe balances **autonomy and cooperation** in the global space order.
- Focuses on **strategic independence** in navigation (Galileo), Earth observation (Copernicus), and secure communications (IRIS²).
- Combines **technological leadership**, **ethical responsibility**, and **diplomatic engagement**.
- Space is now a **pillar of European identity** — unity through science, peace through cooperation.
- ESA and the EU offer a **third way** between superpowers — a **rules-based, human-centered** vision of space.
- Europe's leadership relies on **collaboration and foresight**, not domination.

📍 *Europe leads by example — through science, ethics, and cooperation, not competition.*

Future Prospects

- The coming decades will shape **Europe's long-term presence in space**.
- ESA and the EU plan missions beyond Earth — **Lunar Gateway, Moon Village,** and **Mars exploration**.
- **AI and automation** will drive smarter and more autonomous missions.
- The **commercial space economy** will grow through innovation and start-ups.
- Europe's focus: **responsible, inclusive, and sustainable use of space** for humanity's benefit.

 *Europe's future in space is guided by sustainability, innovation, and cooperation.*

Space Policy as Soft Power and Integration

- Europe shows how **science and technology act as soft power**, advancing influence through **cooperation and shared progress**.
- Space initiatives promote **regional integration**, aligning national goals with a common European vision.
- Programs like **Galileo, Copernicus,** and **Ariane** prove that **technological unity strengthens political unity**.
- ESA and EU projects embody **peaceful cooperation, sustainability, and multilateralism**.
- Europe's space policy mirrors its **integration model — collaborative, trust-based, and forward-looking**.

📍 *Through space, Europe projects unity — power not of dominance, but of cooperation.*

Discussion Questions

- **Can Europe lead in space without military power?**
  - Is “soft power” — based on cooperation, diplomacy, and ethics — enough to sustain influence in an increasingly competitive and militarized space environment?
  - What would “leadership through responsibility” look like in practice?
- **Does space cooperation strengthen European identity?**
  - Has space policy become a form of *European integration* — linking countries through science, technology, and shared ambitions?
  - Can the European space project help citizens feel part of a common geopolitical vision?
- **What are the limits of ‘strategic autonomy’ in space?**
  - Can Europe truly act independently in space when supply chains, launch services, and digital infrastructures remain globally interconnected?
  - How can the EU balance *autonomy* with *partnership* in the new space order?

Thank you for your attention

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