

National Space Agencies in Europe:

Structures, Strategies, and Collaborations

prepared by

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The concept of the paper

Abstract

This paper provides a comprehensive analysis of the national space agencies of various EU (and non-EU) member states, highlighting their structures, funding mechanisms, degrees of independence, and involvement in EU and international space activities. It examines the governance and operational frameworks that guide these agencies, their strategic goals, and the legal regulations under which they operate. Each agency is explored in detail to understand how they contribute to their respective national space programs and to the broader European and global space community.

Additionally, the document identifies the key similarities and main differences between the agencies, offering a comparative perspective that underscores the diverse approaches within the European Union to advancing space capabilities.

In the final section, the document synthesizes the insights gained from these national examples to propose best practices for governments seeking to establish a new national space agency.

By drawing on the experiences and strategies of established space agencies, this document aims to provide valuable guidance and lessons for effective space governance and development.

Executive Summary

The analysis provides a detailed overview of the national space agencies of several EU (and non-EU) member states, highlighting their structure, funding mechanisms, degrees of independence, and involvement in EU and international space activities. It offers a comprehensive look at how these agencies operate, their strategic goals, and the legal frameworks governing their activities.

Austria – Aeronautics and Space Agency: Operates on behalf of the Federal Ministry for Transport, Innovation, and Technology, focusing on implementing national space policy and representing Austria internationally, particularly within the ESA. The agency is part of the Austrian Research Promotion Agency (FFG) and receives funding from the government and ESA.

Belgium – Royal Belgian Institute for Space Aeronomy (BIRA-IASB): A federal scientific research institute specializing in space aeronomy. It operates under the Federal Public Planning Service Science Policy (BELSPO) with a budget partly funded by the government, ESA, and various national and European R&D projects. It has a low degree of independence and is involved in international space programs through ESA and other intergovernmental organizations.

Bulgaria – Space Research and Technology Institute (SRTI-BAS): A key research body under the Bulgarian Academy of Sciences, conducting fundamental and applied studies in space science. It is state-owned, with funding from the state budget and research contracts. Bulgaria is preparing a National Space Policy Strategy and aims to strengthen its space sector and international cooperation.

France – National Centre for Space Studies (CNES): Established in 1961, CNES is a governmental organization responsible for shaping and implementing France's space policy within an international framework, particularly within Europe. It is supervised by the Ministry of Armed Forces and the Ministry of Higher Education and Research, with a substantial budget from government and ESA contributions.

Germany – German Aerospace Center (DLR): The national center for aerospace, energy, and transportation research, founded in 1969. DLR operates as a legally independent entity with significant government funding. It has regulatory responsibilities within Germany and

plays a crucial role in ESA programs, contributing expertise, funding, and research capabilities.

Greece – Hellenic Space Center (HSC): Founded in 2019, HSC is responsible for formulating national space strategy and coordinating public and private sector efforts in space-related activities. It operates under the Ministry of Digital Governance and focuses on integrating EU space services into national practices.

Italy – Italian Space Agency (ASI): Established in 1988, ASI coordinates Italy's space exploration activities and operates under the Ministry of Education, University, and Research. It has significant national and EU funding and plays a key role in ESA, contributing to various European space initiatives.

Luxembourg - Luxembourg Space Agency (LSA): Founded in 2018, LSA supports private space companies and startups, particularly those involved in asteroid mining. It operates under the Ministry of the Economy and benefits from a legal framework that ensures stability and protection for investors. Luxembourg is a full member of ESA and participates in several EU space programs.

Netherlands – Netherlands Space Office (NSO): Established in 2008, NSO advises on national space policy and administers the country's space program. It reports to a steering committee comprising various ministries and organizations. NSO is actively involved in EU and ESA programs, including Galileo and Copernicus.

Norway – Norwegian Space Agency (NOSA): NOSA oversees Norway's public space activities and is entirely funded by its own income. It operates under the Norwegian Ministry of Trade, Industry, and Fisheries and participates in numerous ESA programs. Although not an EU member, Norway engages in EU space programs through the EEA agreement.

Poland – Polish Space Agency (POLSA): Established in 2014, POLSA supports the Polish space industry and promotes the development of satellite technology. It is supervised by a council of government and industry representatives and coordinates Poland's participation in ESA and other international space organizations.

Portugal – Portugal Space (PS) was established in 2019 under the Ministry of Science, Technology, and Higher Education to oversee Portugal's space policy. It collaborates with the Portuguese government, the European Space Agency (ESA), and other international

entities. PS focuses on developing the national space industry, promoting scientific research, and participating in international space missions and programs.

Romania – Romanian Space Agency (ROSA) serves as a public institution coordinating Romania's national space technology research programs. Operating under the Ministry of Education and Research since 1995, ROSA collaborates extensively with various ministries and prioritizes participation in ESA's optional programs.

Spain – Agencia Espacial Española (AEE), operational since April 2023, manages Spain's space program under the Ministry of Science and Ministry of Defense. It receives funding from the Spanish government and the EU, focusing on coordinating national space policies and participating in ESA programs to advance Spain's strategic goals in space.

Sweden – Swedish National Space Agency (SNSA), overseen by the Ministry of Education and Science, manages state-funded space activities. With a modest degree of independence, SNSA collaborates extensively within ESA and international frameworks to advance space research, technology development, and remote sensing, reflecting Sweden's commitment to global space exploration.

These agencies play pivotal roles in their respective countries' space sectors, facilitating international cooperation, advancing scientific research, and contributing to the strategic objectives of ESA and other global space initiatives. Each agency operates within a structured framework aligned with national policies and international collaborations, emphasizing the integration of space technologies for societal and economic benefits.

European Space Agencies

These detailed summaries below provide a comprehensive view of each EU member state's national space agency, highlighting their structure, funding, supervision, and primary activities.

Austria

Austria's Aeronautics and Space Agency (ALR) operates under the Austrian Research Promotion Agency (FFG), overseeing Austria's space policy and representing the nation in global space endeavors. It is supervised by the Federal Ministry for Transport, Innovation, and Technology and receives funding from both the Austrian government and the European Space Agency (ESA). ALR's responsibilities include coordinating Austria's involvement in ESA projects, promoting national space research and industry, and managing the country's overarching space strategy.

The **Aeronautics and Space Agency (ASA)**, operating under the Federal Ministry for Transport, Innovation and Technology, is responsible for implementing Austria's national space policy and representing the country in international forums, particularly within the European Space Agency (ESA).

Structure and Supervision

- **Agency Type:** A division of the Austrian Research Promotion Agency (FFG)
- **Ownership and Supervision:** The agency is overseen by the Austrian Research Promotion Agency, the Austrian Ministry of Climate Action (BMK), and the Government of Austria.
- **Funding Sources:** Primarily funded by the Austrian government and the European Space Agency.
- **Independence Level:** Low, with significant oversight from national authorities.

Responsibilities and Activities

- **Legal Role:** The ASA coordinates Austria's involvement in bilateral and international aerospace programs, aiming to enhance and expand the Austrian aeronautics and space sector.
- **European Union Engagement:** The agency focuses on positioning and networking Austrian industries, economy, and scientific communities internationally. It plays a pivotal role in securing Austria's competitiveness on the global stage. As a central

contact point for space coordination activities, ASA represents Austria in EU bodies, the ESA, and EUMETSAT.

Core Objectives and Program Participation

- **Core Objectives:**
 - International positioning and networking of Austrian industries and scientific bodies.
 - Enhancing Austria's competitive edge in the global aerospace sector.
- **Program Participation:**
 - Active involvement in ESA programs, especially in earth observation (for climate research), navigation, telecommunications, and technology development.

Through these efforts, the Aeronautics and Space Agency of Austria works diligently to integrate the nation into the global space community, fostering innovation and technological advancement.

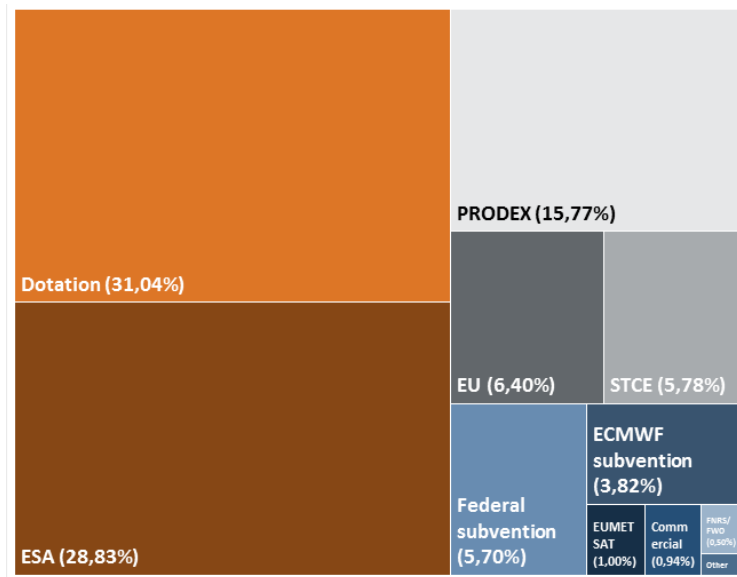
Belgium

Belgium's Royal Belgian Institute for Space Aeronomy (BIRA-IASB) is a federal research institute under the auspices of the Federal Public Planning Service Science Policy (BELSPO). Specializing in space aeronomy, it investigates the physics and chemistry of planetary atmospheres. BIRA-IASB is funded through governmental allocations, contributions from ESA, and various national and European research and development projects. While predominantly government-run, it engages extensively in international space programs through ESA and other intergovernmental collaborations, actively contributing to scientific missions and research initiatives.

The **Royal Belgian Institute for Space Aeronomy (BIRA-IASB)** is a leading Belgian federal scientific research institute focused on the study of space aeronomy. This field involves the physics and chemistry of the Earth's atmosphere, the atmospheres of other planets, and outer space.

Structure and Supervision

- **Institution Type:** Part of the Federal Public Planning Service Science Policy (BELSPO)
- **Ownership and Supervision:** Overseen by BELSPO and the Belgian government.
- **Funding Sources:**
 - **Government Funding:** Structural government funds, including contributions from the Solar-Terrestrial Centre of Excellence, represent about one-third of the institute's budget.
 - **European Space Agency (ESA) Funding:** Another third of the budget is provided by ESA, which has increased in recent years.
 - **PRODEX Funding and R&D Projects:** The remaining third comes from PRODEX (prioritizing space hardware and scientific developments) and various national and European R&D projects. Despite the increase in ESA funding, PRODEX funding has decreased, potentially limiting future mission involvement. However, BIRA-IASB has been more successful in securing national research grants recently.



- **Degree of Independence:** Low, with significant oversight from national authorities.

Responsibilities and Activities

- **Primary Tasks:**
 - Conducting research in space aeronomy, which includes studying the interactions between solar radiation and atmospheric particles, and understanding atmospheric processes on Earth and other planets.
 - Providing public services, such as delivering scientific data and expertise to national and international stakeholders.
- **Research Areas:**
 - Solar-terrestrial interactions
 - Atmospheric chemistry and dynamics
 - Planetary atmospheres
 - Space weather and climate change

European Union Engagement

- **BELSPO's Role:**
 - The "Space Research and Applications" department within BELSPO manages Belgium's contributions to international space programs in collaboration with ESA and other intergovernmental organizations (such as EUMETSAT, ECMWF, and ESO).
 - Coordination of bilateral agreements to foster international scientific cooperation.
- **Core Objectives:**

- Ensuring Belgium's active participation in international space programs and projects.
- Engaging in the "Co-development of place-based climate services for action" project, which focuses on developing tailored climate services to support climate action.

Additional Information

- **Technological Contributions:** BIRA-IASB has been instrumental in developing instruments and technologies used in various space missions. For instance, the institute contributed to instruments on ESA's Rosetta mission and NASA's MAVEN mission.
- **Public Outreach:** The institute engages in extensive public outreach and education efforts, promoting space science and its importance to the general public. They regularly organize events, workshops, and exhibitions to disseminate their research findings and foster interest in space aeronomy.

Through its comprehensive research, public service activities, and international collaborations, the Royal Belgian Institute for Space Aeronomy significantly contributes to the global understanding of atmospheric and space sciences, solidifying Belgium's role in the international space research community.

Bulgaria

Bulgaria's Space Research and Technology Institute (SRTI-BAS), part of the Bulgarian Academy of Sciences, focuses on fundamental and applied research in space science and technology. As a state-owned entity, it is primarily funded by the state budget and research contracts. Bulgaria is in the process of formulating a National Space Policy Strategy aimed at bolstering its space sector and fostering international partnerships. SRTI-BAS contributes significantly to Bulgaria's capabilities in space physics, remote sensing, and satellite technology, playing a pivotal role in advancing the country's space agenda.

The **Space Research and Technology Institute (SRTI)**, under the Bulgarian Academy of Sciences, is the leading research institution in Bulgaria for space science. Its mission encompasses fundamental and applied research in Space Physics, Remote Sensing of the Earth and Planets, and Aerospace Systems and Technologies.

Structure and Supervision

- **Institution Type:** An institute within the Bulgarian Academy of Sciences.
- **Components:**
 - Head Office
 - General Assembly
 - Scientific Council
- **Ownership and Supervision:** State-owned, under the supervision of the Bulgarian Academy of Sciences.

Funding Sources

- **Government Subsidy:** About 50% of the institute's funding comes from a state budget subsidy provided to the Bulgarian Academy of Sciences.
- **External Funding:** The remaining 50% is sourced from research contracts, applied research projects, and business contracts.

Responsibilities and Activities

- **Primary Research Areas:**
 - **Space Physics:** Study of cosmic phenomena and interactions between solar radiation and space particles.
 - **Remote Sensing:** Monitoring and analyzing Earth and planetary surfaces using satellite and aerial imagery.

- **Aerospace Systems and Technologies:** Development of advanced aerospace systems and technologies.
- **Degree of Independence:** Low, with substantial oversight from national authorities.

Legal Relationship and National Strategy

- **National Space Policy:** An inter-ministerial working group, set up at the Ministry, is tasked with preparing a National Space Policy Strategy by the end of 2024. Key priorities include:
 - Developing a competitive national space sector.
 - Strengthening international cooperation.
 - Accelerating Bulgaria's accession to the European Space Agency (ESA) as an associate member.
 - Fostering the development of the space sector's ecosystem.

European Union Engagement

- **Plan for European Cooperating States (PECS):** SRTI is part of the PECS, designed to prepare countries for joining ESA as Associate Members and potentially as full members after review.
- **EU Research Programs:** The institute actively participates in EU framework programs, including the 6th and 7th Framework Programmes and Horizon 2020. Additionally, it is involved in the PHARE programme and collaborations with NATO.

Additional Information

- **Technological Contributions:** SRTI has contributed to various space missions and projects, developing instruments and technologies for space exploration and remote sensing applications.
- **International Collaborations:** The institute collaborates with international space agencies and organizations, enhancing Bulgaria's presence in the global space research community.
- **Public Outreach and Education:** SRTI engages in public outreach activities to promote space science and education in Bulgaria, including organizing workshops, seminars, and public lectures.

Through its extensive research, international collaborations, and public engagement, the Space Research and Technology Institute plays a vital role in advancing space science in Bulgaria and integrating the country into the global space community.

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France

France's National Centre for Space Studies (CNES), established in 1961, plays a crucial role in shaping and executing France's space policy. Supervised jointly by the Ministry of Armed Forces and the Ministry of Higher Education and Research, CNES enjoys substantial funding from the government, ESA, and its own revenue streams. CNES focuses on diverse space missions, satellite development, and international collaboration within the ESA framework, aiming to strengthen France and Europe's competitiveness in space exploration and technology.

The **National Centre for Space Studies (CNES)**, founded in 1961, is the French government space agency responsible for shaping and implementing France's space policy. CNES plays a crucial role in maintaining and developing the competitiveness of France and Europe in the space sector through international cooperation, particularly within Europe.

Structure and Supervision

- **Institution Type:** Governmental organization and a member of the Institute of Space, its Applications, and Technologies (Institut au service du spatial, de ses applications et technologies (ISSAT)).
- **Components:**
 - Paris Les Halles
 - Toulouse Space Center
 - Paris-Daumesnil
 - Guyana Space Center (Kourou)
- **Ownership and Supervision:** Supervised by the Ministry of Armed Forces and the Ministry of Higher Education and Research.

Funding Sources

- **Government Funding:** In 2022, CNES had a budget of €2,566 million, distributed as follows:
 - **Contribution to the European Space Agency (ESA):** €1,184 million
 - **National Programme:** €740 million
 - **Future Investment Programme:** €29 million
 - **Stimulus Plan:** €55 million
 - **Own Resources:** €558 million

Responsibilities and Activities

- **Primary Tasks:**
 - Shaping and implementing France's space policy.

- Maintaining and developing competitiveness in the space sector.
- Ensuring France and Europe's roles as key players in the global space domain.
- **Key Areas of Focus:**
 - Space exploration and research
 - Satellite development and deployment
 - Earth observation and climate monitoring
 - Space transportation and launch services
- **Degree of Independence:** Low, with significant oversight from national authorities.

Legal Relationship and National Strategy

- **Space Operations Act:** CNES operates under this act, which defines its responsibilities and regulatory framework, ensuring compliance with national and international space regulations.

European Union Engagement

- **Key Contributor to ESA:** CNES is one of the main contributors to the European Space Agency. For over 40 years, CNES has managed the Ariane programme, collaborating with European researchers and industry.
- **European Space Transportation Hub:** CNES and ESA are jointly exploring the possibility of creating a European Space Transportation Hub, enhancing Europe's space transportation capabilities.

Additional Information

- **Technological Contributions:** CNES has been instrumental in numerous space missions, including satellite launches, space exploration, and scientific research. It has developed key technologies for space operations and continues to innovate in areas such as propulsion, satellite communication, and Earth observation.
- **International Collaborations:** CNES works with various international space agencies and organizations, fostering global partnerships and contributing to multinational space projects.
- **Public Outreach and Education:** CNES is actively involved in public outreach, promoting space science and technology through educational programs, public events, and media engagement. It aims to inspire the next generation of scientists and engineers by highlighting the importance and excitement of space exploration.

Through its comprehensive research, international partnerships, and public engagement efforts, the National Centre for Space Studies (CNES) plays a pivotal role in advancing space science and technology, ensuring that France and Europe remain at the forefront of space exploration and innovation.

Germany

Germany's German Aerospace Center (DLR), founded in 1969, serves as the national hub for aerospace, energy, and transportation research. While legally independent, DLR operates under federal government oversight and secures funding from government allocations and research contracts. With a well-defined organizational structure comprising a General Assembly, Senate, and Executive Board, DLR actively participates in ESA programs, international space missions, and conducts extensive research in aeronautics, space exploration, and energy technologies.

The **German Aerospace Center (DLR)**, established in 1969, is Germany's national center for aerospace, energy, and transportation research. Headquartered in Cologne, DLR operates 35 locations across Germany.

Structure and Supervision

- **Institution Type:** Registered association with legal independence and its own charter and statutory bodies.
- **Components:**
 - **General Assembly:** DLR's highest body, which delegates essential tasks to the DLR Senate.
 - **DLR Senate:** A supervisory body meeting twice a year, comprising up to 33 members representing scientific, business, industrial, and state sectors equally. The Senate is chaired by a State Secretary in the Federal Ministry for Economic Affairs and Climate Action.
 - **Executive Board:** Manages DLR's day-to-day operations.
- **Ownership and Supervision:** Supervised by the Federal Republic of Germany, specifically the Federal Ministry for Economic Affairs and Climate Action.

Funding Sources

- **Federal Government:** Provides 90% of institutional funding through the Helmholtz Association's programme-oriented funding.
- **Federal States:** Contribute 10% of the funding, corresponding to the locations of DLR's sites.
- **Third-Party Funds:** Additional funding from industry and competitive support programs.

Responsibilities and Activities

- **Primary Tasks:**
 - Conducting research in aerospace, energy, and transportation.

- Ensuring compliance with international space law and national regulations for German space missions.
- **Key Areas of Focus:**
 - Aerospace research and development.
 - Renewable energy and energy efficiency.
 - Sustainable transportation systems.
- **Degree of Independence:** Legally independent but closely supervised and funded by the federal government.

Legal Relationship and National Strategy

- **Regulatory Responsibilities:** Oversees national space activities to ensure compliance with treaties such as the Outer Space Treaty and the Rescue Agreement.
- **Helmholtz Association Membership:** Participates in programme-oriented funding processes, which shape its research agenda and strategic direction.

European Union Engagement

- **Role in ESA:** Germany is a founding member of the European Space Agency (ESA), with DLR playing a significant role in ESA programs by contributing expertise, funding, and research capabilities.
- **European Funding Programs:**
 - **European Green Deal:** Influences DLR's research agenda, focusing on sustainability and climate action.
 - **Horizon Europe, European Defence Fund, and Digital Europe:** Provide additional funding and collaboration opportunities.
 - **Fly the Green Deal:** Part of ACARE's vision, influencing DLR's aeronautics research and innovation to enhance Europe's global competitiveness.

Additional Information

- **Technological Contributions:** DLR is known for its advancements in aerospace technologies, including satellite development, space exploration missions, and innovations in renewable energy and transportation systems.
- **International Collaborations:** DLR collaborates with numerous international space agencies and organizations, enhancing global cooperation in space research and technology development.
- **Public Outreach and Education:** DLR engages in extensive public outreach, promoting STEM education and raising public awareness about aerospace, energy, and transportation research. They organize events, workshops, and educational programs to inspire future generations of scientists and engineers.

Through its comprehensive research initiatives, international partnerships, and public engagement efforts, the German Aerospace Center (DLR) plays a crucial role in advancing aerospace, energy, and transportation technologies, thereby ensuring Germany's and Europe's leadership in these critical fields.

Greece

Greece's Hellenic Space Center (HSC), established in 2019, is tasked with formulating Greece's national space strategy and coordinating public and private sector efforts in space-related activities. Operating under the Ministry of Digital Governance, HSC is funded by the government and collaborates with international organizations. Its objectives include integrating EU space services into national frameworks, fostering innovation in the sector, and collaborating with the scientific community and private sector to achieve strategic goals.

The **Hellenic Space Center (HSC)**, founded in 2019, serves as Greece's national space agency responsible for formulating the country's space strategy and coordinating national space programs across various sectors.

Mission and Collaboration

- **Mission:**
 - Define national space strategy and action plans.
 - Coordinate with scientific, public, and private sectors to set targets and foster collaborations.
 - Manage national programs in scientific research, technology, telecommunications, security, environment, and agricultural development.

Ownership and Supervision

- **Ownership:** Ministry of Digital Governance oversees the HSC.
- **Funding:** Primarily funded by government allocations.
- **Degree of Independence:** Low, with significant oversight from governmental authorities.

Legal Mandate and National Strategy

- **Legal Mandate:** As Greece's space agency, HSC advises and supports the government on space matters and represents Greece in international space organizations.
- **National Strategy:** Developing a space strategy proposal and an action plan to drive Greece's space initiatives forward.

European Union Engagement

- **Member of ESA:** Greece is a member of the European Space Agency (ESA), collaborating on various ESA programs and initiatives.

- **EU Space Program:** Actively participates in the EU Space Program, particularly leveraging Copernicus services:
 - **Copernicus Services:** Integrating Copernicus services like the Emergency and Land components into operational practices.
 - **Collaboration:** Engages in EU initiatives to enhance environmental monitoring, security, and disaster management using space-based technologies.

Additional Information

- **Technological Advancements:** HSC contributes to advancements in satellite technology, remote sensing, and applications in agriculture, environment, and security.
- **International Collaborations:** Collaborates with international space agencies and organizations to leverage expertise and resources in space exploration and research.
- **Public Engagement:** Conducts outreach activities to raise awareness about space technology benefits and inspire interest in space science among the public and students.

The Hellenic Space Center plays a pivotal role in advancing Greece's space capabilities, fostering innovation, and leveraging space technology for societal and economic benefits. Through strategic partnerships and active participation in European and international space initiatives, HSC contributes to Greece's integration into the global space community.

Italy

Italy's Italian Space Agency (ASI), founded in 1988, coordinates Italy's space exploration activities under the Ministry of Education, University, and Research. ASI adheres to government guidelines and receives substantial funding from national and EU sources, enabling active participation in ESA projects and international space initiatives. ASI focuses on satellite development, space exploration missions, and scientific research, playing a pivotal role in European space programs such as Galileo and Copernicus.

The **Italian Space Agency (ASI)**, established in 1988, plays a pivotal role in Italy's space exploration efforts, overseeing funding, regulation, and coordination of the nation's space activities. Headquartered in Rome, ASI operates under the auspices of the Ministry of Education, University, and Research (MIUR), and aligns its strategies with the National Research Plan (PNR) and international policies managed in conjunction with the Italian Ministry of Foreign Affairs.

Structure and Operations

ASI's organizational structure comprises 8 management directorates and a Strategic Area, designed for effective oversight across diverse space sectors. Beyond its Rome headquarters, ASI directly manages the Centre for Space Geodesy (CGS) in Matera, Italy, and the Broglio Space Centre in Kenya, utilized primarily as a communications ground station.

Ownership and Supervision Rights

Supervised by MIUR, ASI holds the mandate to draft and execute the National Aerospace Plan, overseeing Italian space research agencies like the Italian Aerospace Research Centre (CIRA). The agency also facilitates opportunities for Italian industrial contractors in spaceflight projects through coordinated calls and proposals.

Funding and Degree of Independence

ASI's funding primarily derives from government allocations and European Union funding streams. Operating within a structured framework, ASI exercises its activities with a considered degree of independence, closely tied to national aerospace priorities outlined in the National Aero-Space Plan (PASN).

Legal Relationship and EU Activities

At the national level, ASI assumes responsibility for the National Aerospace Plan's implementation, driving Italy's strategic interests in space exploration. Internationally, ASI

represents Italy within the European Space Agency (ESA), where Italy ranks as the third-largest contributor, influencing ESA policies and initiatives.

Governance and Strategic Planning

ASI engages in diversified governance and management practices, holding minority or majority stakes in joint-stock companies with public and private entities. Strategic planning is formalized through the National Aero-Space Plan (PASN) and detailed in the Three Years Activities Plan (PTA), ensuring coherence between operational goals and statutory mandates.

Conclusion

ASI stands at the forefront of Italy's space exploration endeavors, integrating national aspirations with European partnerships to advance scientific discovery and technological innovation in aerospace. Its collaborative efforts within ESA underscore Italy's commitment to the global space community.

Luxembourg

Luxembourg's Luxembourg Space Agency (LSA), established in 2018, supports the growth of private space companies with a focus on asteroid mining and space resources. Operating under the Ministry of the Economy, LSA benefits from a stable legal framework that attracts private investments. The agency's activities center around fostering innovation, supporting startups, and participating in international collaborations. As a full member of ESA, Luxembourg actively contributes to various EU space programs, aligning national objectives with broader European space initiatives.

The **Luxembourg Space Agency (LSA)** serves as the national space agency of the Grand Duchy of Luxembourg, established on September 12, 2018, under the leadership of Luxembourg's Economy Minister, Étienne Schneider. The agency aims to leverage state funding to support private companies, startups, and organizations involved in space exploration, particularly focusing on initiatives such as asteroid mining.

Ownership and Supervision

LSA operates under the oversight of the Ministry of the Economy. The Luxembourg Space Agency Foundation is supervised by its Board of Directors, chaired by Mario Grotz, Director General for Industry, Technology, and Research at the Ministry of Economy. This governance structure ensures strategic direction and efficient management of national space initiatives.

Funding and Independence

Funding for LSA is derived from government sources, supporting its mission to foster innovation and economic growth in the space sector. The agency operates with a low degree of independence, aligning its activities with national economic priorities and strategic objectives outlined by Luxembourg's economic policies.

Legal Framework and Space Activities

Luxembourg has developed a robust legal framework to regulate space activities, highlighted by laws such as the Law of 15 December 2020 on Space Activities and the pioneering Law of 2017 on the Exploration and Use of Space Resources. These laws provide stability and legal certainty for private operators engaged in space exploration and resource extraction, positioning Luxembourg as a leader in space law within Europe and globally.

EU and International Engagements

Luxembourg became a full member of the European Space Agency (ESA) in 2005, participating actively in ESA's various programs including telecommunications, navigation, Earth observation, exploration, and science. The country also engages in EU space policy initiatives such as the Global Navigation Satellite System (GNSS), Copernicus, European Space Surveillance and Tracking (EUSST), Govsatcom, and Horizon 2020 Space programs. In 2024, LSA joined the European Space Policy Institute (ESPI) as a new member, further solidifying its role in shaping European space policies and strategies.

Conclusion

The Luxembourg Space Agency plays a crucial role in advancing Luxembourg's ambitions in space exploration and utilization, supported by a progressive legal framework and active participation in European and international space initiatives. By fostering innovation and collaboration, LSA contributes to the growth of the space sector while ensuring legal protection and regulatory stability for private ventures.

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Netherlands

The Netherlands' Netherlands Space Office (NSO), established in 2008, advises on national space policy and administers the country's space program. Reporting to a steering committee comprising ministries and organizations, NSO is funded by the Dutch government and engages in ESA projects. NSO coordinates national space research, promotes industry collaboration, and integrates space services into Dutch society. Actively involved in EU and ESA programs like Galileo and Copernicus, NSO plays a pivotal role in advancing Dutch space capabilities.

The **Netherlands Space Office (NSO)** was established by the Dutch government in 2008 to advise on and implement the Netherlands' space policy, overseeing the development and administration of the country's space program.

Structure and Operations

NSO reports directly to a steering committee comprising representatives from key ministries: the Ministry of Economic Affairs, the Ministry of Education, Culture and Science, the Ministry of Infrastructure and Environment, the Ministry of Foreign Affairs, and the Netherlands Organisation for Scientific Research (NWO). The office is organized into four substantive teams focused on NSO's strategic goals, supported by three additional teams providing administrative and logistical support. These teams operate under the leadership of a two-person management team, ensuring a coordinated approach to national space initiatives.

Ownership and Supervision

NSO operates under the supervision of multiple government entities, including the Ministry of Economic Affairs, the Ministry of Education, Culture and Science, the Ministry of Infrastructure and Environment, the Ministry of Foreign Affairs, and the Netherlands Organisation for Scientific Research (NWO). This multi-stakeholder oversight ensures alignment with broader national policies and objectives.

Funding and Degree of Independence

Funding for NSO is primarily sourced from government allocations, supporting its mandate to advance Dutch interests in space exploration and technology. The office operates with a low degree of independence, working closely within the governmental framework to implement and advocate for strategic space initiatives.

Legal Framework and Regulatory Responsibilities

NSO plays a crucial role in managing the legal and regulatory aspects of Dutch space activities, ensuring compliance with national laws and international treaties such as the Outer Space Treaty. The office oversees licensing processes for satellite launches and other space missions involving Dutch entities, safeguarding legal integrity and international obligations.

EU and International Engagements

Within the European Union, NSO actively participates in flagship initiatives such as the Galileo satellite navigation system and the Copernicus Earth observation program. These engagements underscore the Netherlands' commitment to leveraging space technology for economic, societal, and environmental benefits within the EU framework. At the European Space Agency (ESA) level, NSO represents Dutch interests across various program boards, contributing to mandatory programs like astrophysics and optional programs aligned with national priorities. Despite its modest financial contribution relative to some other ESA member states, the Netherlands maintains significant influence and visibility within ESA through targeted investments and strategic collaborations.

Conclusion

The Netherlands Space Office plays a pivotal role in advancing Dutch space policy and technology, supported by a comprehensive legal framework and active participation in European and international space initiatives. By fostering innovation and regulatory compliance, NSO contributes to the growth of the Dutch space sector while promoting global cooperation and sustainable space exploration.

Norway

Norway's Norwegian Space Agency (NOSA) oversees public space activities and promotes the development of Norway's space sector. Operating under the Ministry of Trade, Industry, and Fisheries, NOSA sustains itself through revenue generated by space-related services and projects. Despite Norway not being an EU member, NOSA actively participates in numerous ESA programs and collaborates internationally. Its focus areas include satellite operations, space research, and supporting domestic space industry growth.

The **Norwegian Space Agency (NOSA)** is a governmental agency tasked with overseeing Norway's public space activities, ensuring that Norway maximizes the benefits from its engagements in space.

Structure and Operations

NOSA operates through four interconnected departments, collaborating to foster growth within the Norwegian space industry. These departments work in tandem to develop and manage space-related infrastructure that meets the needs of Norwegian users and contributes to economic value creation through space activities.

Ownership and Supervision

NOSA is wholly owned by the Norwegian Ministry of Trade, Industry, and Fisheries, ensuring direct governmental oversight and alignment with national economic policies. This ownership structure underscores NOSA's role in advancing Norway's strategic interests in space.

Funding and Independence

Unlike many other national space agencies, NOSA operates on a self-financing basis, generating its income internally and not relying on grants from the Norwegian government. The agency adheres to standard business principles in its financial management, ensuring accountability and sustainability in its operations.

Legal Framework and Strategic Goals

NOSA is mandated to develop and operate space infrastructure that serves Norwegian users and enhances national capabilities in space-related activities. The agency identifies and pursues long-term opportunities and projects, collaborating closely with national communication and space operators. Norwegian space activities are guided by strategic goals that include promoting profitable companies, meeting societal needs, protecting

critical space infrastructure, and safeguarding national interests in foreign, security, and defense policies related to space.

EU and International Engagements

Since becoming a member of the European Space Agency (ESA), Norway has actively participated in a wide array of ESA programs. These programs encompass Earth observation, manned space exploration, development of launch systems, and more, focusing particularly on applications that benefit Norwegian society. Norway joined Galileo, the European satellite navigation system, in 2010, and subsequently became involved in Copernicus, the European program for environmental monitoring and civil security. As Norway is not a member of the European Union, its participation in EU space programs such as Galileo and Copernicus is periodically reviewed and approved by the Norwegian Parliament within the framework of the European Economic Area (EEA) agreement.

Conclusion

The Norwegian Space Agency plays a critical role in advancing Norway's capabilities and interests in space, leveraging strategic partnerships with ESA and participation in EU programs to enhance national innovation, economic growth, and societal resilience. By focusing on applied uses of space technology and strategic alignment with national priorities, NOSA contributes significantly to Norway's position in the global space community.

Poland

Poland's Polish Space Agency (POLSA), established in 2014, supports the Polish space industry and advances satellite technology and space research. Supervised by a council of government and industry representatives, POLSA is funded through the national budget and participates in ESA programs. The agency coordinates Poland's involvement in international space organizations, promotes innovation and research in the sector, and enhances the country's capabilities in satellite technology and space exploration.

The **Polish Space Agency (POLSA)** was established by the Act of 26 September 2014 with a mission to support and advance the Polish space industry through collaboration between business and scientific communities. The agency also facilitates access to funding opportunities from the European Space Agency (ESA) for Polish entrepreneurs. Key objectives include promoting satellite technology for everyday applications such as communication, navigation, environmental monitoring, and weather forecasting.

Structure and Operations

POLSA operates through several specialized departments:

- Strategy & International Cooperation Department
- Research & Innovation Department
- Space Safety Department
- Earth Observation Department
- Satellite Telecommunications & Navigation Department
- Information and Promotion Department
- Organizational Office

Headquartered in Gdansk, POLSA also maintains branches in Warsaw and Rzeszow, facilitating national outreach and operational efficiency.

Ownership and Supervision

The POLSA Council serves as the supervisory and advisory body, responsible for developing strategic development proposals and research programs in space. Composed of government representatives, as well as experts from science and industry, the council provides oversight on action plans, regulatory acts, and financial management, ensuring alignment with national priorities and effective resource allocation.

Funding and Independence

POLSA operates on government funding, supporting its activities aimed at enhancing Poland's capabilities in space technology and innovation. The agency's operational autonomy is guided by national policies and strategic initiatives, maintaining a structured approach to program implementation and resource management.

Legal Framework and Strategic Initiatives

The organizational structure and mandate of POLSA are defined by regulations established by the Ministry of Development and Technology, ensuring clarity and coherence in the agency's operations. POLSA is actively involved in coordinating Polish participation in EU programs, ESA initiatives, EUMETSAT, and the European Defence Agency (EDA), focusing on space research, technology development, and satellite applications. Notably, Poland's commitment to ESA is underscored by significant financial allocations, supporting the country's active role in ESA's mandatory and optional programs.

EU and International Engagements

POLSA plays a pivotal role in representing Polish interests within ESA, with permanent delegates participating in decision-making processes across various ESA programs. Poland's influence within ESA continues to grow, supported by POLSA's substantive expertise and strategic contributions. Additionally, POLSA coordinates and enhances Poland's participation in EU space initiatives, fostering collaboration and leveraging European partnerships for mutual benefits in space research and technology.

Conclusion

The Polish Space Agency, through its strategic initiatives and active engagement in international space collaborations, contributes significantly to Poland's advancement in space technology and innovation. By promoting scientific research, facilitating industry partnerships, and securing funding opportunities, POLSA strengthens Poland's position as a key player in the global space community, driving economic growth and societal benefits through space exploration and applications.

Portugal

Portugal's Portugal Space (PS), founded in 2019, serves as the national space agency, overseeing space policy implementation under the Ministry of Science, Technology, and Higher Education. Funded by the Portuguese government and collaborating with ESA and other international entities, PS focuses on developing the national space industry, fostering scientific research, and participating in international space missions and programs.

Portugal Space, established by the Portuguese government in collaboration with the regional government of the Azores in 2019, serves as the national space agency of Portugal.

Structure and Operations

Portugal Space operates under the governance of its General Assembly, consisting of founding and adherent associates. This body includes a president, vice-president, and secretary who convene regularly to discuss global issues pertinent to the space sector and the agency's strategic direction. The agency's Financial Committee, with oversight responsibilities, includes members designated by the General Assembly, ensuring financial integrity and compliance.

Ownership and Supervision

Founding members of Portugal Space include the Foundation for Science and Technology (FCT), the National Innovation Agency (ANI), the Ministry of Defence, and the Regional Government of the Azores. The Autonomous Region of Madeira joined as an observer in December 2019, aiming for full membership in the future. This multi-stakeholder ownership structure facilitates strategic alignment and diverse input in national space policies and initiatives.

Funding

Portugal Space operates primarily on government funding, with annual allocations authorized by the Portuguese government. From 2023 to 2027, the agency receives €9.25 million (\$10.25 million) annually to support its activities, ensuring sustainable development and growth of the Portuguese space sector.

Degree of Independence

Portugal Space operates with a low degree of independence, functioning within the framework of national policies and strategic objectives defined by the Portuguese government and its regional partners. This structure ensures alignment with broader national goals and enhances coordination of space-related programs and initiatives.

Legal Framework and Strategic Goals

The agency is tasked with implementing "Portugal Space 2030," the national space strategy focused on research, innovation, and economic growth. Emphasizing Portugal's Atlantic identity and maritime heritage, the strategy aims to position Portugal as a global authority in the science and economics of Space-Earth-Climate-Oceans interactions, benefiting both society and the economy. It underscores space as a common good associated with national institutions and collective ambitions.

EU and International Engagements

Portugal Space coordinates Portuguese participation in the European Space Agency (ESA), advising the government on contributions and subscriptions to ESA programs. Collaborating with the Foundation for Science and Technology (FCT), the agency manages funds from ESA and the European Southern Observatory (ESO), representing Portugal in international organizations such as the European Solar Telescope (EST). Portugal Space also serves as Portugal's national representative to the European Commission for space-related matters, contributing to initiatives like Copernicus, Galileo, GOVSATCOM, SSA (Space Situational Awareness), and Horizon Europe. Additionally, it participates in governance bodies like the board of directors of the European Union Agency for the Space Program (EUSPA, formerly GSA).

Conclusion

Portugal Space plays a crucial role in advancing Portugal's space capabilities and international partnerships, supported by strategic funding, governance structures, and a forward-looking national strategy. By fostering innovation, enhancing research, and promoting sustainable development, the agency contributes to Portugal's prominence in the global space arena while leveraging European collaborations for mutual benefit.

Romania

Romania's Romanian Space Agency (ROSA) is a public institution responsible for coordinating Romania's national space technology research programs and space-related activities. It operates under the authority of the Romanian government, specifically the Ministry of Education and Research since 1995. ROSA reports to the Subcommittee on Space in the Romanian Parliament since 2007 and is also involved with the Inter-Ministerial Council for Security Research and the INSPIRE Inter-Agency Expert Group. While ROSA receives government funding, its degree of independence is relatively low. The agency collaborates extensively with various ministries including Defence, Foreign Affairs, Agriculture and Environment, Interior, and Telecommunications and IT. It functions as the contracting authority and PMU for national research programs in Space, Aeronautics, and Security, and plays a pivotal role in national certification for GRID information infrastructures. ROSA prioritizes Romania's participation in ESA's optional programs such as launchers, earth observation, Galileo, human space flight and robotic exploration, telecommunications, integrated applications, security programs, technology, and scientific support.

The **Romanian Space Agency (ROSA)** is a public institution responsible for coordinating Romania's national space technology research programs and activities related to space exploration.

Structure and Operations

ROSA's organizational structure is designed to facilitate comprehensive management and oversight of space-related initiatives:

- **Board of Directors**
- **General Director**
- **Scientific Council**
- **Departmental Management:** Includes various sections such as International Programs, Financial Control and Internal Audit, Critical Infrastructure Protection, Legal Services, and more.
- **Strategy and Cooperation Department:** Oversees ROSA Research Center, Strategic Development, Property and Intellectual Property, Information System Infrastructure, Business Development, Cooperation with ESA, Security Structure, Space Applications, International Relations, Certification Authority, Information, Promotion, and Public Relations.
- **ROSA Center:** Manages economic and administrative functions, human resources, and occupational safety services.

Ownership and Supervision

ROSA operates under the authority of the Romanian government, specifically the Ministry of Education and Research, which has overseen its activities since 1995. The agency reports to the Subcommittee on Space within the Romanian Parliament (established in 2007) and participates in inter-ministerial councils and expert groups focused on security research and technological development.

Funding

ROSA's activities are predominantly funded by the Romanian government, ensuring continuity and support for national space initiatives. This funding mechanism enables the agency to pursue its strategic objectives and contribute to Romania's development in space technology and research.

Degree of Independence

ROSA operates with a low degree of independence, functioning within the framework of national policies and under governmental oversight. This structure ensures alignment with strategic national priorities and facilitates effective coordination of space-related programs and collaborations.

Legal Framework and Strategic Initiatives

ROSA plays a pivotal role in Romania's space sector by coordinating national research programs and fostering inter-agency cooperation across ministries such as Defense, Foreign Affairs, Agriculture, Environment, Interior, Telecommunications, and Intelligence Services. The agency is involved in establishing R&D centers and contributes to Romania's technological research and development plan.

EU and International Engagements

As a member of the European Space Agency (ESA), Romania participates in ESA's mandatory programs and prioritizes involvement in optional programs based on national interests. These include programs on launchers, Earth observation, Galileo (European satellite navigation system), human space flight and robotic exploration, telecommunications, integrated applications, security, and technology support. ROSA represents Romania in ESA bodies and contributes to shaping European space policy through active participation in international collaborations and projects.

Conclusion

ROSA's strategic initiatives and active participation in ESA and other international programs underscore Romania's commitment to advancing its space capabilities and leveraging space technology for economic and societal benefits. By promoting research, innovation, and international cooperation, ROSA contributes to Romania's integration into the global space community while supporting national development objectives.

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Spain

Spain's Agencia Espacial Española (AEE), established on 27 May 2021 and operational since 20 April 2023, is responsible for Spain's space program. Structured into four bodies—Governing body, Executive body, Supervisory body, and Advisory bodies—the AEE operates under the Ministry of Science and the Ministry of Defense. It is funded by the Spanish government and EU allocations, with an initial budget of 700 million euros per year sourced primarily from ESA participation, the CDTI, and INTA. The agency's degree of independence is characterized as low, focusing on managing national space policies and coordinating all space services to support Spain's strategic action in space. Spain's engagement with ESA involves both mandatory and optional programs, with significant financial commitments made during ESA Ministerial Council meetings.

The **Agencia Espacial Española (AEE)** is the agency of the Spanish government responsible for managing and coordinating Spain's national space program. Officially announced on 27 May 2021, the agency became operational on 20 April 2023.

Structure and Operations

The Spanish Space Agency (AEE) operates through a structured framework designed to facilitate effective management and oversight:

- **Governing Body:** Comprising the Presidency and the Governing Council.
- **Executive Body:** Includes the General Directorate, various divisions, and the Space and Society Office.
- **Supervisory Body:** Consisting of the Supervisory Committee and the Standing Committee.
- **Advisory Bodies:** Comprising Division Support Committees.

This structured approach enables AEE to implement national space policies, coordinate space activities, and support Spain's strategic initiatives in the aerospace sector.

Ownership and Supervision

AEE operates under the authority of the Ministry of Science and the Ministry of Defense, ensuring alignment with governmental priorities and strategic objectives in space exploration and technology development.

Funding

AEE receives funding from the Spanish government and the European Union. The agency's initial budget stands at 700 million euros annually, sourced primarily from ESA participation funds, the Center for Industrial Technological Development (CDTI), and the National Institute of Aerospace Technology (INTA). This funding supports AEE's activities in advancing Spain's capabilities in space research, technology, and exploration.

Degree of Independence

AEE operates with a low degree of independence, functioning within the framework of national policies and under governmental oversight. This ensures that the agency's activities are aligned with Spain's strategic interests and contribute effectively to national development goals in the space sector.

Legal Framework and Strategic Initiatives

AEE is tasked with managing and coordinating all national space policies, ensuring the efficient deployment of space services, and supporting the Spanish government's strategic actions in space-related endeavors. The agency plays a pivotal role in promoting technological innovation and international collaboration in space exploration.

EU and International Engagements

Spain is a founding member of the European Space Agency (ESA) and actively participates in ESA's mandatory and optional programs. At the ESA Ministerial Council meetings, Spain commits annual contributions based on these programs, reflecting its significant role and commitment within the European space community. Recent milestones include Spain's increased funding commitments and the selection of two Spanish astronauts to join ESA's new astronaut corps, highlighting Spain's growing influence and participation in European space initiatives.

Conclusion

The Spanish Space Agency (AEE) plays a crucial role in advancing Spain's space capabilities and fostering international cooperation in space exploration and technology. By leveraging government funding, strategic partnerships, and institutional frameworks, AEE contributes to Spain's leadership in the global space sector, supporting scientific research, innovation, and economic growth.

Sweden

Sweden's Swedish National Space Agency (SNSA), a government agency managing Swedish state-financed space activities, operates under the Ministry of Education and Science. Its management ensures efficient operations in compliance with applicable laws, overseen by a board appointed by the Swedish government. SNSA receives government funding, totaling SEK 1.3 billion in 2023, distributed among ESA contributions, national programs, and support for the Esrange Space Center. The agency's degree of independence is modest, aligned with Sweden's long-term space strategy formulated by the government. SNSA facilitates international cooperation and funds space research, technology development, and remote sensing activities. Most of its budget supports collaborations within ESA and other international frameworks, reflecting Sweden's commitment to advancing space exploration and applications through global partnerships.

The **Swedish National Space Agency (SNSA)** is a government agency responsible for managing state-financed space activities in Sweden.

Structure and Operations

SNSA operates under a structured framework to ensure efficient management and oversight of Swedish space activities:

- **Management and Oversight:** The agency's management is accountable to the Swedish government, ensuring activities are conducted efficiently and in compliance with national laws.
- **Board of Directors:** Appointed by the Swedish government, the board oversees strategic direction and decision-making.

Ownership and Supervision

SNSA is owned and supervised by the Ministry of Education and Science, aligning its activities with national educational and scientific priorities.

Funding

SNSA receives funding primarily from the Swedish government to support various aspects of space activities:

- **Total Funding for 2023:** SEK 1.3 billion (approximately EUR 115.3 million)
 - ESA: SEK 914 million (EUR 81 million)
 - National Programs: SEK 218 million (EUR 19.3 million)

- Esrange Space Center: SEK 58 million (EUR 5.1 million)
- Administrative Appropriation: SEK 47 million (EUR 4.2 million)

Degree of Independence

SNSA operates with a low degree of independence, adhering to governmental strategies and policies outlined for Swedish space activities. The agency's funding distribution and strategic initiatives are aligned with national goals.

Legal Framework and Strategic Initiatives

The Swedish government has established a strategy for Swedish space activities, providing a long-term framework for SNSA's operations. Key tasks include:

- Distributing government grants for space research, technology development, and remote sensing activities.
- Initiating and supporting research and development initiatives in space and remote sensing.
- Serving as Sweden's primary contact for international cooperation in space.

EU and International Engagements

SNSA coordinates Sweden's interests in international space cooperation, representing Sweden in various international forums and collaborations. The agency has the authority to sign contracts in the space sector on behalf of Sweden and engages extensively within the framework of the European Space Agency (ESA) and through bilateral agreements. A significant portion of SNSA's budget is dedicated to international cooperation, highlighting Sweden's commitment to collaborative efforts in advancing space exploration and technology.

Conclusion

The Swedish National Space Agency (SNSA) plays a crucial role in managing and advancing Sweden's capabilities in space research, technology development, and international cooperation. By leveraging governmental funding and strategic partnerships, SNSA contributes to Sweden's leadership in the global space community while supporting scientific research, innovation, and societal benefits.

Similarities and Differences Between European Space Agencies

Similarities

1. Government Supervision and Oversight:

- Most national space agencies operate under the supervision of relevant government ministries. This ensures alignment with national policies and provides a structured framework for their operations.
- Examples: CNES (France) under the Ministry of Armed Forces and Ministry of Higher Education and Research, ASI (Italy) under the Ministry of Education, University, and Research.

2. Funding Mechanisms:

- Agencies typically receive funding from national government budgets and contributions from the European Space Agency (ESA).
- Examples: CNES (France), DLR (Germany), ASI (Italy), POLSA (Poland).

3. Participation in ESA and International Collaboration:

- Active participation in ESA programs and international collaborations is a common practice, enhancing their capabilities and contributing to global space initiatives.
- Examples: DLR (Germany), ASI (Italy), NSO (Netherlands), LSA (Luxembourg).

4. Focus on Research and Development:

- Many agencies prioritize research and development in various fields of space science and technology, contributing to advancements in satellite technology, space exploration, and aeronautics.
- Examples: BIRA-IASB (Belgium), SRTI-BAS (Bulgaria), DLR (Germany).

5. Supporting National Space Industry:

- Agencies aim to foster the growth of their national space industries by supporting private companies and startups, providing funding, and facilitating innovation.
- Examples: LSA (Luxembourg), POLSA (Poland), Portugal Space (Portugal).

Differences

1. Degree of Independence:

- Some agencies operate with a high degree of independence, while others are closely supervised by government ministries.
- High Independence: DLR (Germany) operates as a legally independent entity with government supervision.

- Low Independence: BIRA-IASB (Belgium) and SRTI-BAS (Bulgaria) are closely integrated into government structures.

2. Funding Sources:

- While most agencies are primarily government-funded, some have diverse funding sources, including private investments and income generated through their own activities.
- Diverse Funding: LSA (Luxembourg) attracts private investments through its legal framework supporting private space companies.
- Government-Funded: CNES (France) and ASI (Italy) rely heavily on government and ESA contributions.

3. Strategic Focus:

- Agencies have different strategic priorities based on national interests, such as scientific research, industry support, international collaboration, or specific technological advancements.
- Industry Support: LSA (Luxembourg) focuses on fostering private companies, especially in asteroid mining.
- Scientific Research: BIRA-IASB (Belgium) emphasizes research in space aeronomy.

4. Organizational Structure:

- Organizational structures vary, with some agencies having complex hierarchical structures and others being more streamlined.
- Complex Structure: DLR (Germany) has a General Assembly, Senate, and Executive Board.
- Streamlined Structure: NSO (Netherlands) operates with a steering committee comprising various ministries and organizations.

5. Legal and Regulatory Framework:

- The legal frameworks governing the agencies differ, affecting their operations and strategic decisions.
- Specific Legal Framework: Luxembourg has laws on space activities and resource exploration that ensure stability and protection for investors.
- General Government Regulation: Other agencies like ASI (Italy) operate under broader governmental guidelines.

6. International Participation:

- While most agencies are active in ESA, some also participate in other international space organizations or have unique international collaborations.

- Broad International Collaboration: DLR (Germany) participates in various international space missions beyond ESA.
- ESA Focused: NSO (Netherlands) primarily engages with ESA programs.

Summary

The national space agencies of EU member states share commonalities in government oversight, funding mechanisms, participation in ESA, and a focus on R&D and industry support. However, they differ in their degrees of independence, funding sources, strategic focuses, organizational structures, legal frameworks, and specific international collaborations. These differences reflect the unique national priorities and strategic goals of each country in advancing their space capabilities and contributing to global space endeavors.

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Best Practices for Setting Up a National Space Agency

1. Clear Mission and Objectives:

- Define a clear mission that outlines the agency's primary goals and objectives, such as research, development, international cooperation, and industry support. For instance, France's CNES focuses on maintaining and developing France and Europe's competitiveness in space.

2. Structured Organization:

- Establish a structured organization with defined departments and roles to ensure efficient operation. Germany's DLR is structured with a General Assembly, Senate, and Executive Board, providing clear oversight and direction.

3. Legal and Regulatory Framework:

- Implement a robust legal and regulatory framework to guide the agency's operations and ensure compliance with international treaties. Luxembourg's space activities are governed by specific laws on space activities and resource exploration, ensuring stability and protection for investors.

4. Government Oversight and Supervision:

- Ensure government oversight and supervision through relevant ministries to align the agency's activities with national policies and strategies. Italy's ASI is supervised by the Ministry of Education, University, and Research and operates under governmental guidelines.

5. Funding Mechanisms:

- Secure diverse funding sources, including government budgets, international collaborations, and private investments. France's CNES has a mixed funding model including government contributions, ESA funding, and its own resources.

6. International Collaboration:

- Foster international collaboration and participation in global space programs. Many EU countries, such as Germany, France, and Italy, are active contributors to the European Space Agency (ESA) and other international space programs.

7. Stakeholder Engagement:

- Engage with various stakeholders, including the scientific community, private sector, and international partners, to create a comprehensive and

inclusive space strategy. Greece's Hellenic Space Center collaborates with scientific communities and public and private sectors to define its targets.

8. Strategic Planning and Policy Development:

- Develop strategic plans and policies that outline short-term and long-term goals, action plans, and priority areas. Poland's POLSA has a defined organizational structure and strategic programs of research and development.

9. Independence and Accountability:

- Maintain a degree of operational independence while ensuring accountability through government supervision and performance evaluations. Germany's DLR is legally independent but supervised by the federal government.

10. Public and Private Sector Partnerships:

- Encourage partnerships between public institutions and private companies to leverage expertise, share risks, and enhance innovation. Luxembourg's Space Agency focuses on supporting private companies, especially those in asteroid mining.

11. Focus on Capacity Building:

- Invest in capacity building, including training, education, and development of local talent to support the space sector. Bulgaria's Space Research and Technology Institute conducts fundamental and applied studies and is involved in various educational and research programs.

12. Compliance with International Standards:

- Ensure that the national space agency adheres to international standards and best practices, participating in global treaties and agreements. Germany's DLR oversees compliance with international space law and national regulations.

Summary

Setting up a national space agency involves establishing a clear mission, structured organization, robust legal framework, and diverse funding mechanisms. Engaging with stakeholders, fostering international collaboration, and ensuring compliance with international standards are crucial. By following these best practices, a government can create a successful and sustainable space agency that contributes to national and global space exploration and development.

Key Takeaways

- **Governance and Supervision:** Most national space agencies operate under the supervision of relevant government ministries, ensuring alignment with national policies and strategies.
- **Funding Sources:** Funding mechanisms vary, typically involving government budgets, ESA contributions, and, in some cases, private investments and research contracts.
- **Degree of Independence:** While many agencies have a low degree of independence, operating under strict governmental supervision, some, like Germany's DLR, maintain legal independence with oversight.
- **International Collaboration:** Active participation in ESA and other international space programs is a common theme, highlighting the importance of international cooperation in advancing national space agendas.
- **Strategic Goals:** Agencies focus on various strategic goals, including enhancing national competitiveness in space, fostering scientific research, supporting industry growth, and ensuring compliance with international space laws.

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