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30th Workshop on Space Technology for Socio-Economic Benefits:
"Challenges and Capacity-building Opportunities for Emerging Space Nations"

Needs of Peru to develop an industry and space ecosystem

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**Peru's Past, Present,
and Overall Status:
Academia, Government,
and Industry**



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Introduction

- Perú, located on the western coast of South America, has a diverse and steadily growing economy.
- Key economic sectors include mining, agriculture, manufacturing, tourism, and services.
- The country has been exploring opportunities for economic diversification.
- While not a major player in the aerospace and technology sectors, Peru has shown interest in space research and satellite technology.
- Economic growth and technological development are areas of focus for Peru's future.



Past

- Pedro Paulet was an early 20th-century Peruvian pioneer in rocket science and space propulsion theory.
- The Huancayo Observatory was founded in March 1922 at the initiative of the Carnegie Institution for the purpose of monitoring and researching the magnetic equator.
- NASA Sounding Rocket Campaigns at the geomagnetic equator in Peru (Punta Lobos): 1975 - 19 rockets / 1983 - 18 rockets
- The Jicamarca Radio Observatory, founded in 1960, was established for ionospheric and atmospheric research, specifically focusing on the equatorial region.
- National Commission for Aerospace Research and Development (Comisión Nacional de Investigación y Desarrollo Espacial—CONIDA) was established in 1974 .
- CONIDA SAT was a project carried out by the Peruvian Space Agency to locally build its first satellite.
- The Paulet Project is an initiative in which Peru proposed the development of sounding rockets.

Present

Gobierno del Peru



GOVERNMENT



PRO innóvate



INDUSTRY



ACADEMIA



Peru's Past, Present, and Overall Status: Academia, Government, and Industry

Government

- **IGP-Radio Observatory of Jicamarca:**
 - Operation of the world's largest incoherent scatter radar (ISR) of its kind.
 - Development and operation of various radars, including AMISR-14, SIMONE, JASMET-30, and HF radars.
 - Approval of the project to expand radar capabilities supported by NSF.
 - Maintenance and expansion of the Low Latitude Ionospheric Sensor Network (LISN) with new GPS receivers and ionosondes.
 - Technology transfer and development of instruments related to the ionosphere.
- **CONIDA (National Commission for Aerospace Research and Development):**
 - Acquisition of the Earth observation satellite system, PerúSAT-1, from Airbus Defense and Space.
 - Establishment of the National Center for Satellite Image Operations (CNOIS).
 - Qualification of Peruvian specialists to operate the satellite system.
 - Offering of courses and educational programs in satellite imagery and space-related topics.
 - Representation of Peru in the Asia-Pacific Space Cooperation Organization (APSCO).
 - Project for capacity building in young Peruvian professionals.
 - Peru SAT satellite imagery is utilized by various government entities for a wide range of purposes including agricultural studies, land registry updates, defense and security initiatives, among others.



Government

- **CONCYTEC (National Council of Science, Technology, and Technological Innovation) and PROINNOVATE:**
 - Awarding of scholarships for master's studies in aerospace technologies between 2015 and 2017.
 - Definition of priority areas for state financing in scientific and technological projects (Aerospace it is not considered).
- **Congress of the Republic:**
 - Declaration of national interest and public necessity for the formulation of a satellite communications development plan in 2020.
 - Recognition of the growing demand for satellite communication services in Peru.
- **Ministry of Transport and Communications (MTC):**
 - Formation of working groups to evaluate options for the purchase of a new satellite for remote area communications.
 - Approval of conclusions regarding the estimated demand for satellites to connect remote areas of the country in 2023.

Academy

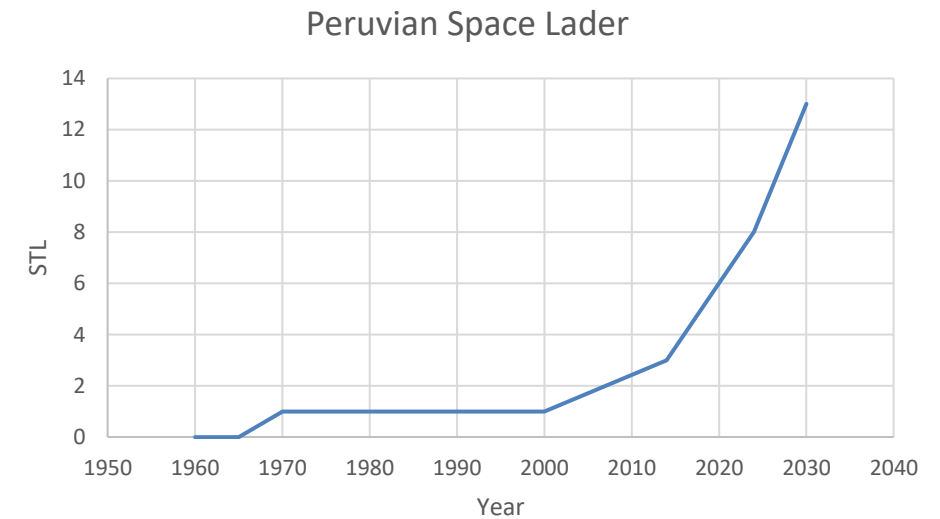
- **R&D:** Universities conduct advanced research in fields like aeronautics and telecommunications, leading to aerospace innovations.
- **Satellite Projects:** PUCP and UNI have launched satellites, demonstrating technical capabilities.
- **Aerospace Projects:** Universities engage in aerospace endeavors, including rockets and space robotics.
- **Fundamental Research:** Academic institutions contribute to aerospace by conducting fundamental research in various sciences and disciplines as Astronomy, Space Weather, Materials Science, among other disciplines.
- **Human Resource Development:** Universities offer aerospace-related degree programs in science and engineering, such as physics, telecommunication, electronics, and mechanical engineering, among other programs.
- **Technology Transfer:** Collaboration with industry enables academic knowledge application to real-world aerospace challenges, there are some Peruvian spin-off and open innovation hackathons.
- **Social Impact:** UNI's Smart Machines Lab seeks to apply aerospace technology to address social issues.

Industry

- Peru's aerospace industry primarily focuses on providing services, including satellite imagery, internet connectivity, and satellite communications.
- Notably, companies like Telemática, Smart Group, and TESAM offer GIS services and IoT solutions using satellite data.
- These Peruvian companies typically lack space infrastructure and primarily function as service providers.
- While Peru exhibits many factors conducive to aerospace industry development, management decisions in recent decades have hindered the establishment of a robust aerospace sector similar to other examples.
- Collaboration with international partners and technology transfer can play a crucial role in the development of the aerospace industry, as seen in the example of Brazil's Embraer.
- Despite potential and favorable factors, the aerospace industry in Peru has yet to reach its full potential, with a focus on services rather than infrastructure development.

What step of the ladder (STL) are we on?

- We have a current Space Agency.
- We procure a Low Earth Orbit (LEO) observation satellite (PERU SAT) acquired with training services.
- We are currently evaluating the acquisition of a Geostationary Earth Orbit (GEO) communications satellite in the future.
- Agreements have been signed to assess the construction of a spaceport in northern Peru.



02

Challenges and Needs: Lessons Learned



Challenges

- The Peruvian government through its science and technology project financing entity (CONCYTEC) doesn't recognize the space sector as a priority for the development of the country.
- The Peruvian government's bureaucratic processes often require trained personnel with technical expertise and government management skills.
- Lack of companies and career pathways in the aerospace sector.
- Brain drain without return or collaboration with the country.
- Bottleneck in job opportunities, refers to the situation where there are students trained in the aerospace sector or motivated but they do not find job openings in that sector
- Lack of postgraduate programs related to aerospace in Peru.
- As a result, there is a shortage of experts in aerospace technology development in the country.



Challenges

- **Knowledge Transfer:** Frequent changes in personnel lead to a loss of institutional knowledge. Trained experts leave their positions, making it challenging to pass on critical expertise and experience to new employees.
- **Disruption in Projects:** Ongoing projects face disruptions or delays when key personnel responsible for their execution change roles or leave. This affects the continuity and progress of important initiatives.
- **Policy Consistency:** Changes in leadership result in shifts in policy direction or priorities, impacting the long-term planning and strategy of government agencies, including those involved in aerospace endeavors.
- **Training Costs:** Continually training new personnel to replace those who depart can incur significant costs in terms of time and resources.



Needs:

- **International Technology Transfer:** Collaboration and knowledge exchange with aerospace experts and institutions from other nations are paramount. Leveraging external expertise and technology can expedite domestic aerospace capabilities. Especially when there are few experts in aerospace sciences in Peru.
- **Increased Funding Access:** Gaining access to augmented financial resources, both domestically and from the international community, is essential. Such resources would enable investments in research, development, and the execution of ambitious aerospace projects. It is also important for the Peruvian entrepreneurial ecosystem to be aware of these opportunities.
- **Private Capital Activation:** Encouraging private sector involvement, be it established aerospace companies or burgeoning startups, is pivotal for fostering innovation and ensuring sustained growth within the industry.
- **National Aerospace Prioritization:** The recognition of the aerospace sector as a national priority can be transformative. Government support and policies specifically tailored to aerospace development can drive significant progress.
- **Enhanced Development Facilities:** Establishing state-of-the-art laboratories and research facilities will provide the requisite infrastructure for conducting pioneering aerospace initiatives, facilitating technological advancements and innovation.

03

Peru's Aerospace Journey: Success Stories and Future Prospects



Successful projects

- PERUSAT-1:
 - PeruSat-1, a satellite by Airbus Defence and Space, was launched on September 15, 2016, and is operated by Peru's CONIDA for terrestrial observation. All government agencies have free access to its image services during its 10-year lifespan.
- CNOIS and Satellite Imagery Usage (Government, Companies):
 - Utilizing imagery from government sources and private companies has enhanced data collection and analysis capabilities.
 - The involvement in the COPERNICUS program, with funding from the Spanish government, serves as a notable success in leveraging satellite imagery for various applications.
- Jicamarca Radio Observatory (International Cooperation, NASA, Cornell, Mentoring):
 - Successful collaboration with international institutions such as NASA and Cornell University has facilitated knowledge exchange and technical expertise.
 - Mentoring programs have provided valuable guidance and support to emerging talent in the aerospace field.

Successful projects

- APSCO instruments Network and Training:
 - Participation in the APSCO network of magnetometers and other network instruments.
 - Training initiatives (master's degrees, doctorates, workshops, short training programs) obtained from APSCO signifies Peru's dedication to advancing space science and technology.
- University Programs (WANKA, Pumi/Tharsis):
 - The establishment of university programs like WANKA (4th generation) and Pumi/Tharsis (3th generation) demonstrates the commitment to educating the next generation of aerospace professionals.
- World Space Week Organization:
 - Successfully organizing the World Space Week highlights Peru's commitment to promoting space science and education.



Future prospects

- LINKU Project (satellite) in collaboration with APSCO.
- Rocket Campaign in Peru for 2028 to study the Equatorial Ionosphere in collaboration with NASA.
- Establish a university-based space program, including mentorships and internships, to cultivate young professionals in the space sector.
- Collaborate extensively with universities, academic institutions, and companies, both nationally and internationally, for joint commercial academic activities. Foster partnerships for technology transfer, certified laboratories, expert exchanges, and internships to build a critical mass of specialists.
- Collaborate with the foreign space industry for technology exchange and capacity building.
- Collaborate with the Peruvian government to establish a space technology development fund that is accessible to both public and private entities, allowing CONIDA to seek direct financing from the Peruvian government with the approval of its new law.



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Ciencia y Tecnología espacial para el desarrollo

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