Developing a Space Program for Mexico

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RED TEMATICA DE CIENCIA Y TECNOLOGIA CONACYT

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- History
- Mexico today
- Strategies
- Projects and actions
- Conclusions

Mexico Today

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- There are several industries growing rapidly in Mexico.
- Aeronautics have set manufacturing facilities in Sonora, Jalisco and B. California.
- Design and Manufacturing facilities are in Queretaro
- Automotive sector is growing for moving Mexico from the 9th to the 5th world producer of light vehicles, 14 OEMs and 1600 -1700 suppliers.
- Electronics cluster in Jalisco
- Mature Science groups in several universities (Telecomm, astronomy. Nanotech, biotech, oceanography, etc))
- Private and Public research Centers GE, Delphi Siemens, Visteon, Safran Honeywell CIATEQ; CIDESI; CIMAV; UNAM,CINVESTAV, etc.)

Figure 1. Automotive distribution map 2004. Taken from http://www.amip.org.mx/

INEGI STATISTICS: ***37 million on poverty***
5% of active population unemployed
We need a million employments per year, we are generating half of that

Mexico Today

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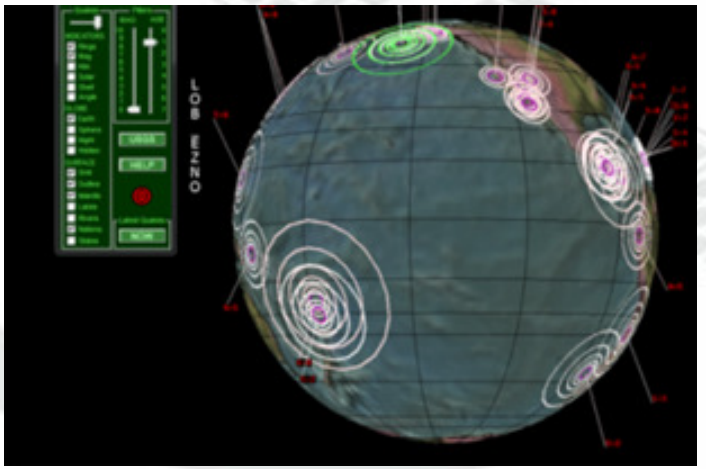
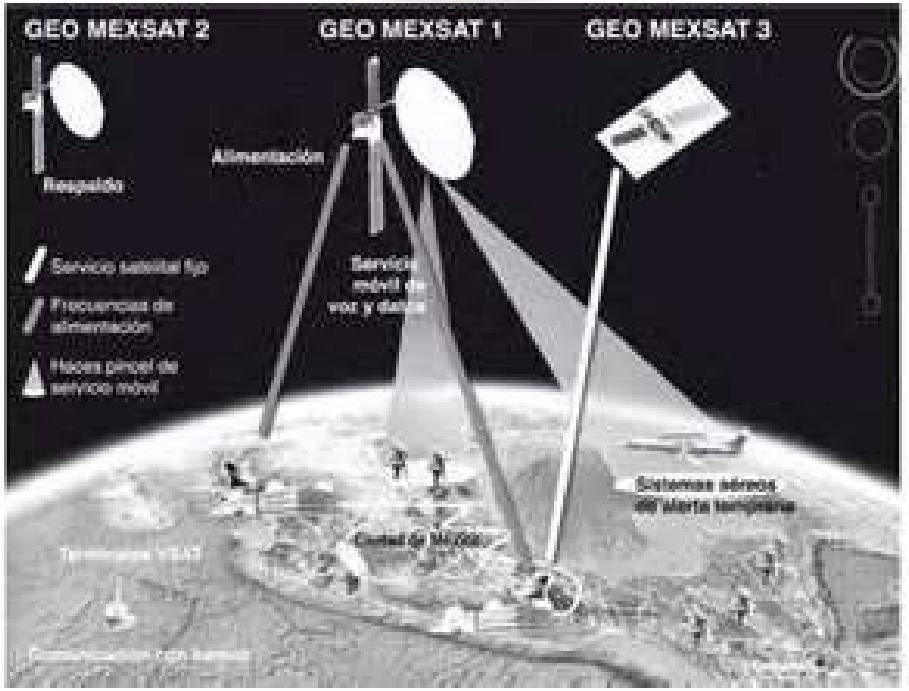
•After lenghty discussions, the AEM was approved in an structure that let them work in the longer term with a new model.
•They started operation a little longer than a year ago.
•In the meantime a new communications constellations was bought MEXSAT, under the pressure of an obsolescent system, **the drug cartels fightling and antiterrorism policies.** One satellite is for communications (Banda Ka) and other for security use. No offset was obtained.
•**2000 million dollars** were spent, and there is an estimated life of 12 to 15 years.
We changed government last December, a significant swift was done, by the AEM influence
THE SPACE IS CONSIDERED NOW IN LEO; MEO AND GEO ORBITS: A SOCIETAL APPROACH HAS BEEN CHOSEN.





Mexico Today

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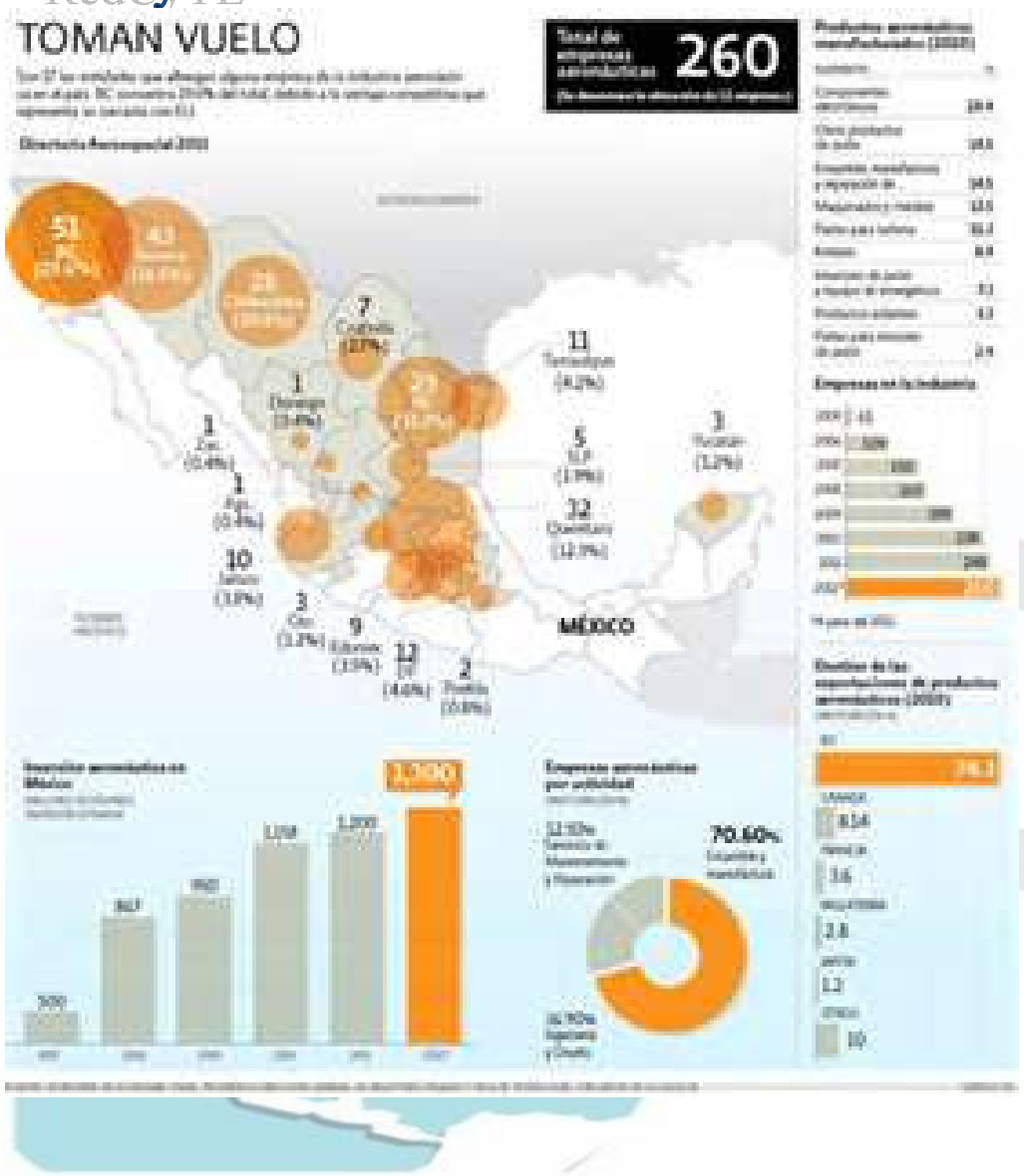

- Changing economic models have favored moving private R&D facilities to Mexico
- There is a national policy to focus on high technology design and development
- There is a strong pressure for getting highly qualified engineers and Scientifics with a holistic systems development vision
- Technological change in Leo and MEO platforms. COTS technology is a huge opportunity for fast development in Micro and nano satellite.
- Societal approach for services like remote education, health and disaster prevention.

Institutions represented in the academic committee of REDCYTE

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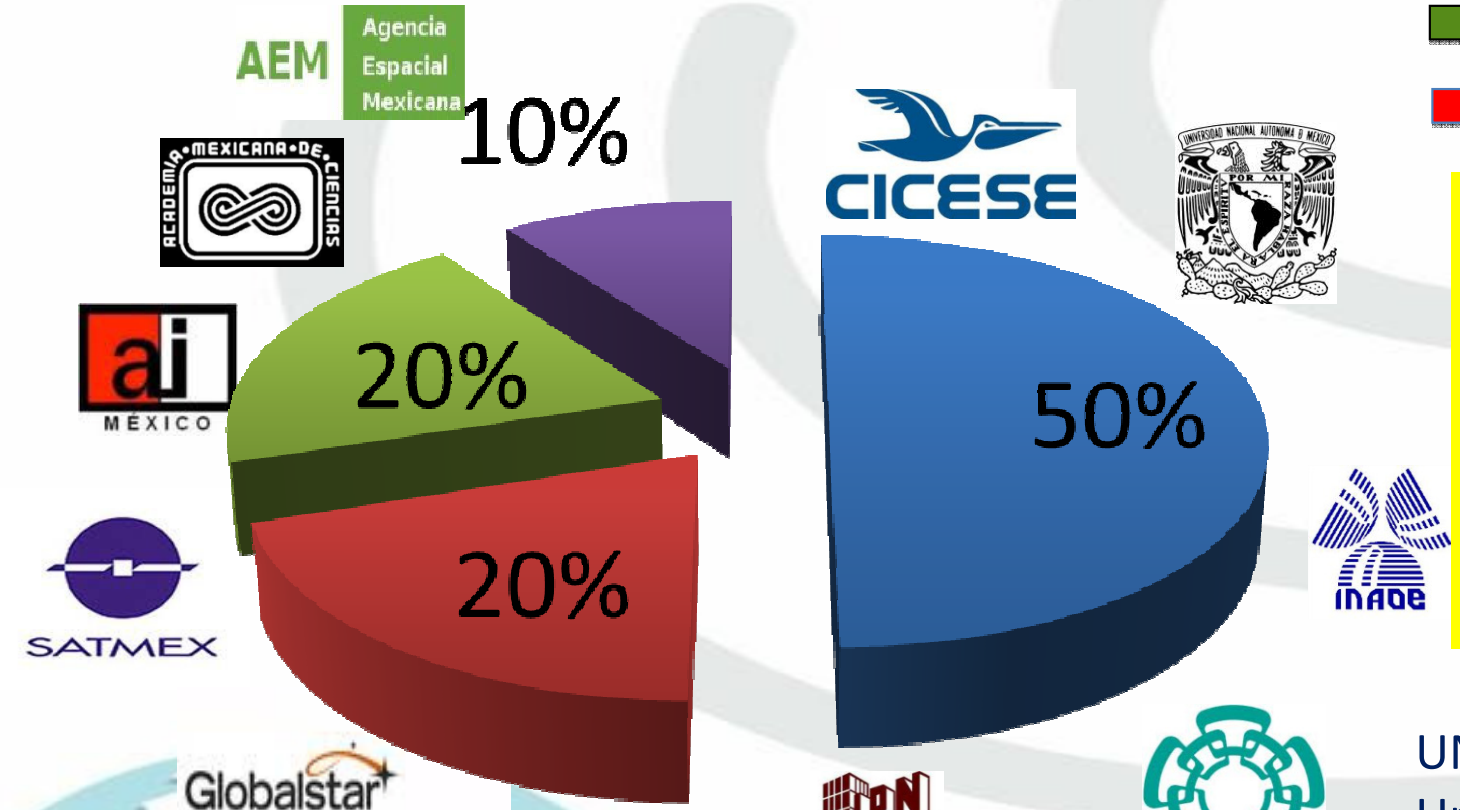

- Civil Society (2)
- Academic Sector (5)
- Industry (2)

140 members
19 Universities and higher education institutions
6 R&D centers
3 Civilian Associations
8 Companies
2 Research centres from the Armed forces

UNAM is the largest University of Mexico with Over 300 000 students. Mexico has more than 300 universities, both public and private systems

Mexico´s Early Warning initiative

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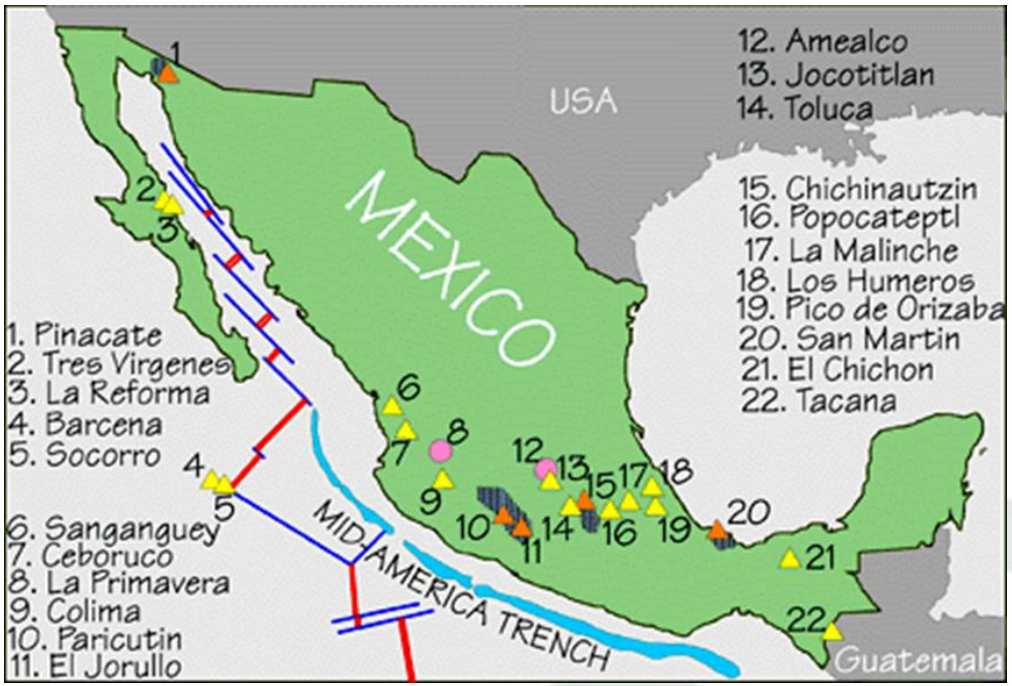

Mexico is a big country, every year we have the following problems:

- **Active Volcanoes** Popocatepetl, Colima, Orizaba
- **Earthquakes**: The Saint Andrews failures runs along all our pacific Coast line.
- **Hurricanes**: We receive at least 4 or 5 every year of great intensity
- **Flooding**: The south of the country is very vulnerable for lenghty rainy season and big hurricanes
- Forest Fires**: We have been suffering a huge** increased on them.
- **Draught**: Las 12 years have been the driest in a century in the north of the country
- **Pollution** in big cities Mexico, Monterrey, Guadalajara, Querétaro

Orbit Plan

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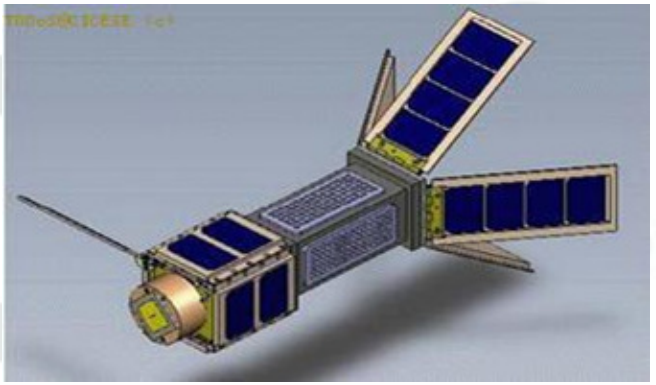
- Integration of a constellation with foreign collaboration and technology transfer under negotiation for building systems of the last one in Mexico.
- Mission: Technology favoring missions of high societal impact
- Vision: Integration of capable groups through local and international networking.
- Develop missions in LEO for remote sensing using different technologies
- Getting a combined scheme developing satellites with foreign collaboration, while getting capability development through academic programs and research satellites.



AEM REDCYTE approach

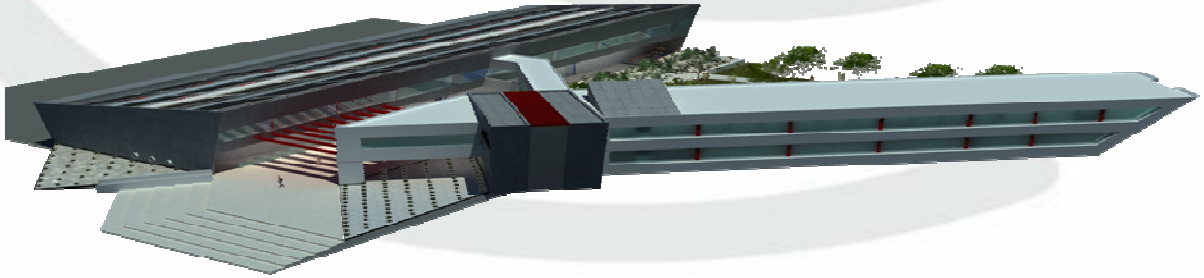
Support the development of a first lab for integration an testing of Nano and microsatellites.

UNAM is already working on that.

trengthen infrastructure for:

- Materials development
- Optics
- Telecommunications
- Prototype development

reate an action plan for developing a certification organism in the country for space development



AEM REDCYTE agreements

Examples of joint REDCYTE AEM projects:

- **Space instrumentation development**: Radar, cameras, spectrometers, radiometers (UK, Russia,
- **Ground stations and image processing facilities program** for downloading and distributing images and information for the early warning system.
- **CANSA**T program for attracting young students from smaller universities to the Space Science and Technology (3 people for this year in JAPAN)

30 persons course at UNAM in summer, plus another **3** people next 2 years)

- **Uniform project development methodology (MISTI UNAM 2) for the institutions working within the network**
- Starting wok on **space sustainability** and debris removal

Actions: Medium term

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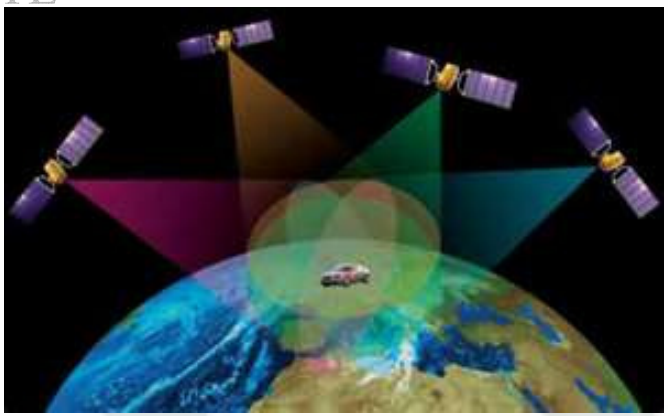
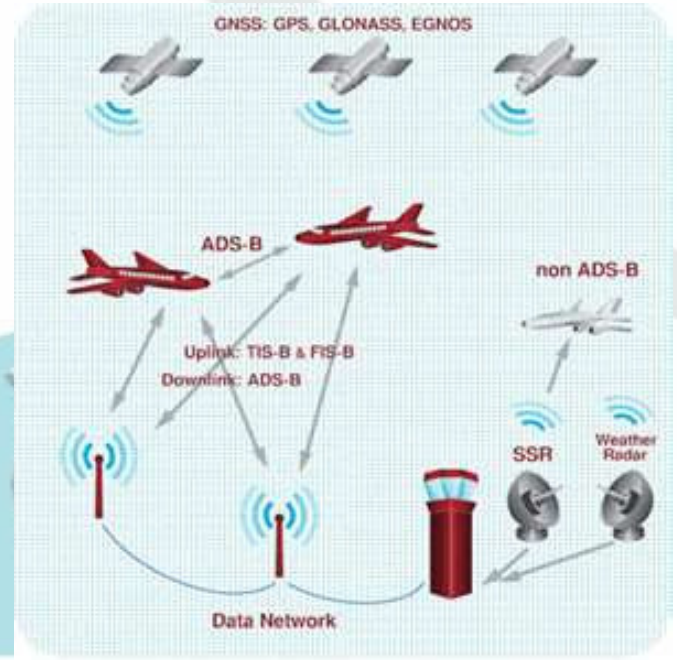
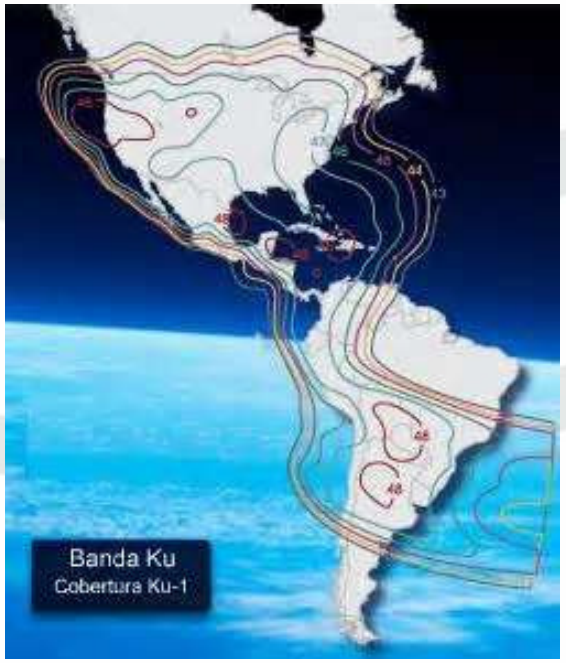




- Use of the satellite infrastructure for linking remote communities and provide health, education and communications . We have more than 10 000 communities with le than a 100 persons, plus the native cultures, in very poor conditions.
- Develop new business for monitoring, communications and location by satellite in the country.
- Use MEO orbit for new communications faster and bandwidths and technologies for speeding information transfer for the early warning systems
- Explore MEO for current GEO applications

Long Term Goals AEM REDCYTE

- Consolidate an innovation ecosystem for technology development based on societal applications and new business opportunities based on space technology
- Integrate Mexican institutions in international cooperation missions.
- Position Mexico as an good actor in the international space community.
- Develop capabilities in a 12 years span to build the 60% of a GEO system or its equivalent.



Projects and actions :

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1. Microsatellites:

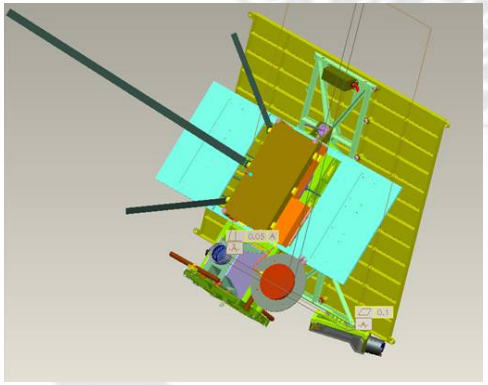
- **CONDOR MAI** *UNAM CICESE CONABIO MAI LAVOCHKIN*
- **SATEX 2** *INAOE UNAM BUAP CICESE*
- ***QUETZAL MIT*** UNAM CICESE

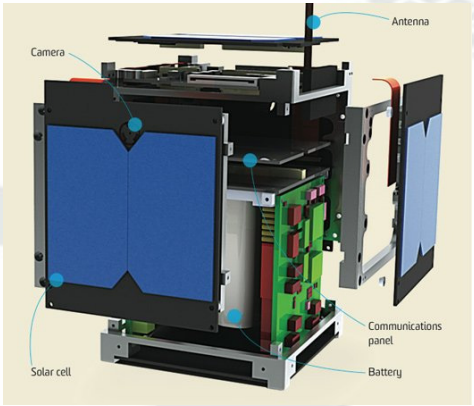
MISTI AND UNAM FUNDING

2. Nano satellites

- **SENSAT** *CICESE VIVETEL UABC CITEDI*
- **TUBESAT** *CONACULTA UNAM*
  AZTECASAT *IPN California Tech NASA Globalsatar*

3. ***Picosatellites*** **CANSAT** Program for undergraduates in regional contests- 3 people this year in Japan.





Projects :

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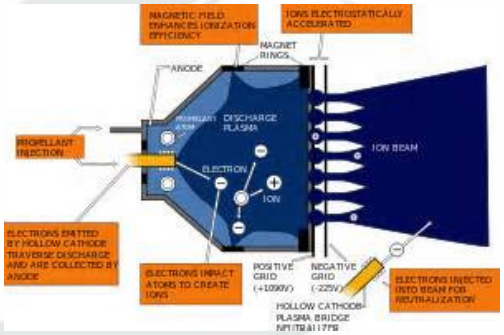


3.Infraestructuraling for testing

- **Automation of a vacuum chamber for thermal cycling of systems.**

•Integration and testing lab afos space systemas at UNAM (ICN-CAT FI)

4.Satellite propulsion lab

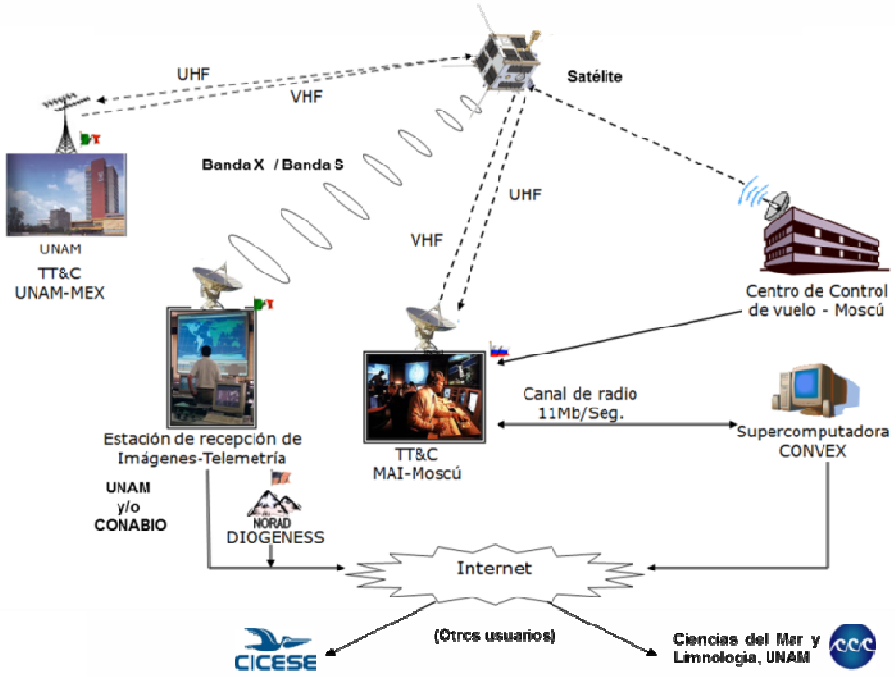
•*CAT FI UANL*

5.Aerial platforms for system testing:

•Ballon testing platforms

TCN UNAM UABC NASA

jEM EUSO CONDOR



ICN-CAT UNAMSpace system s Lab for integration and testing

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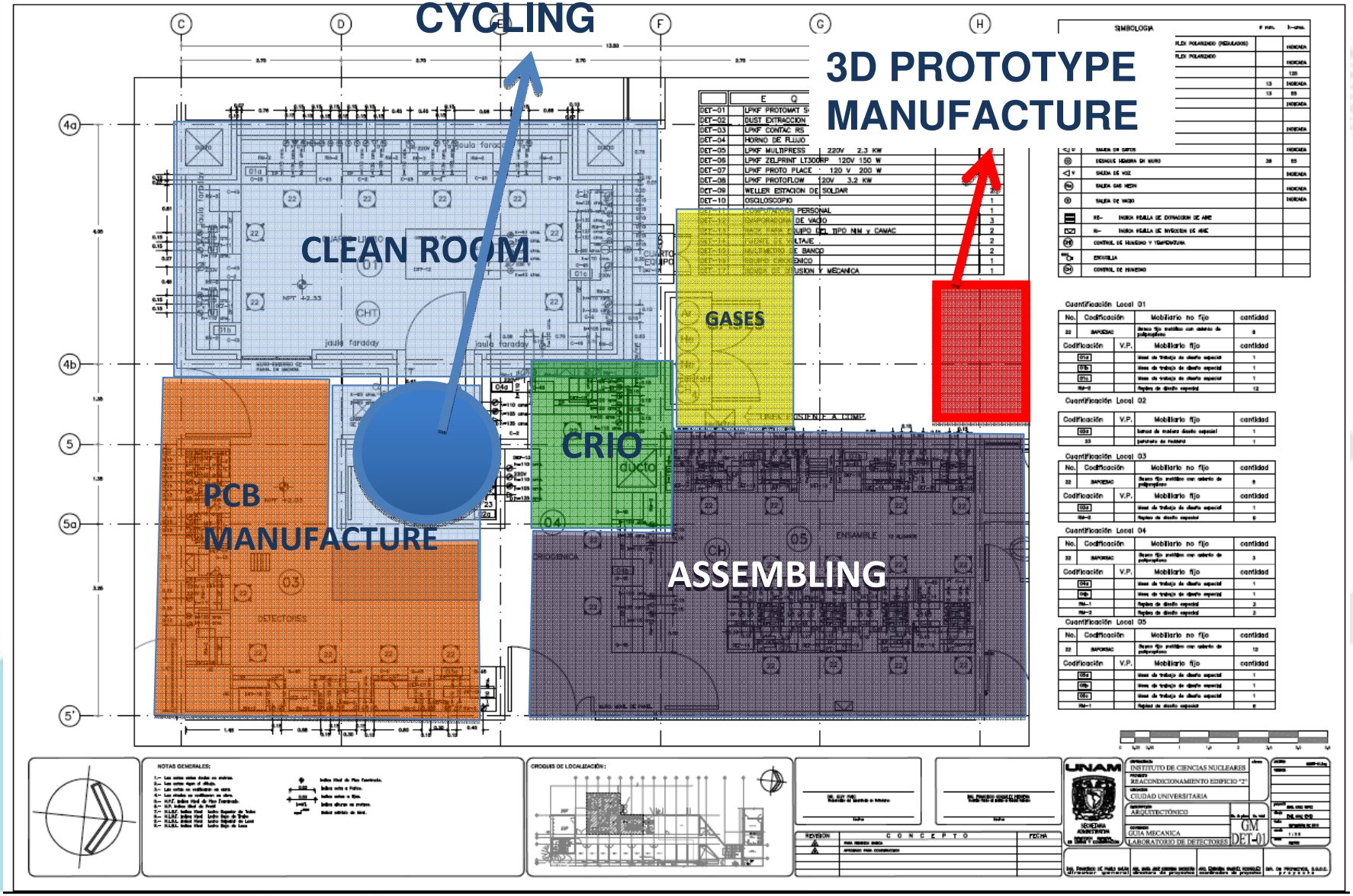
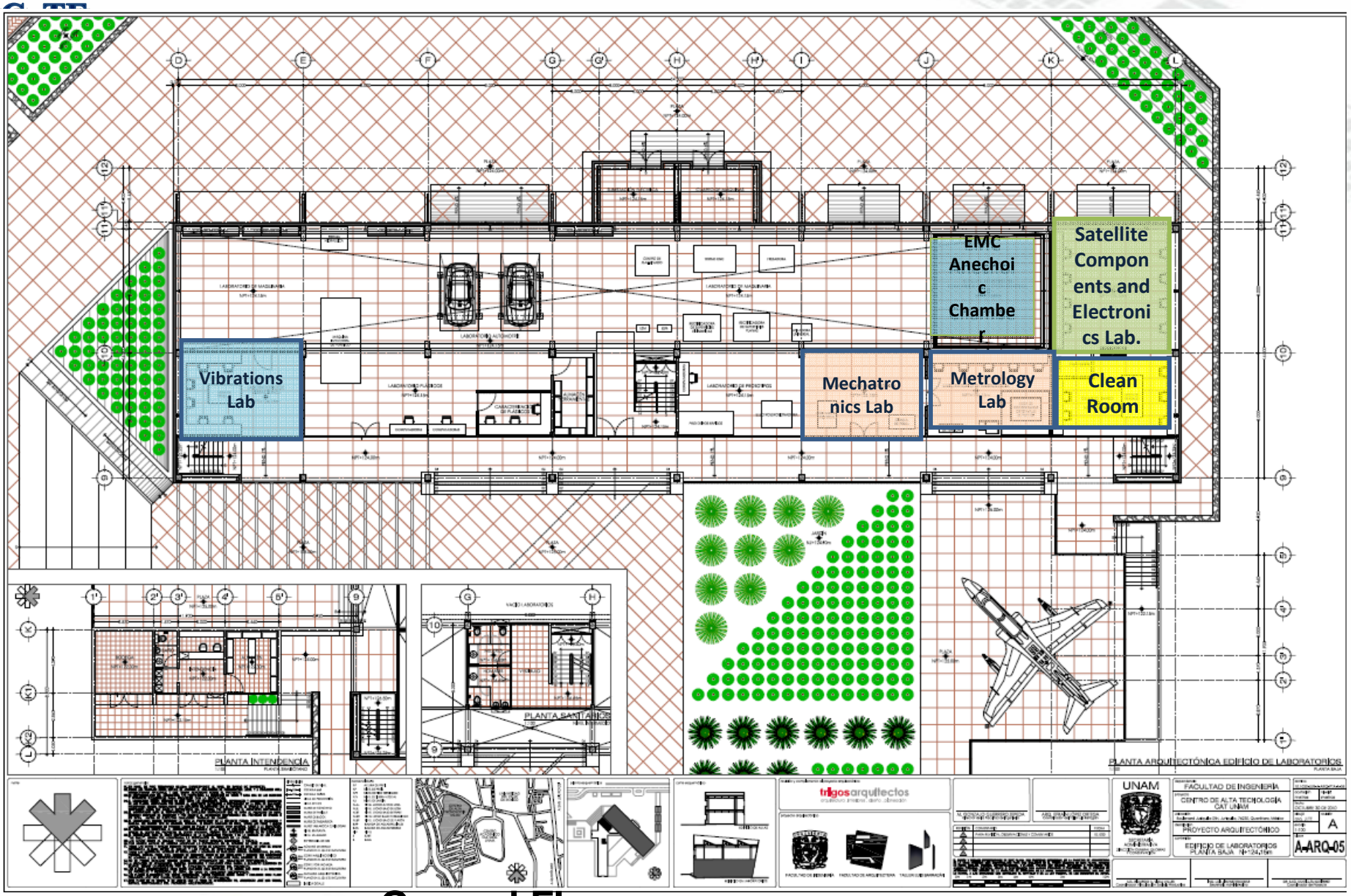
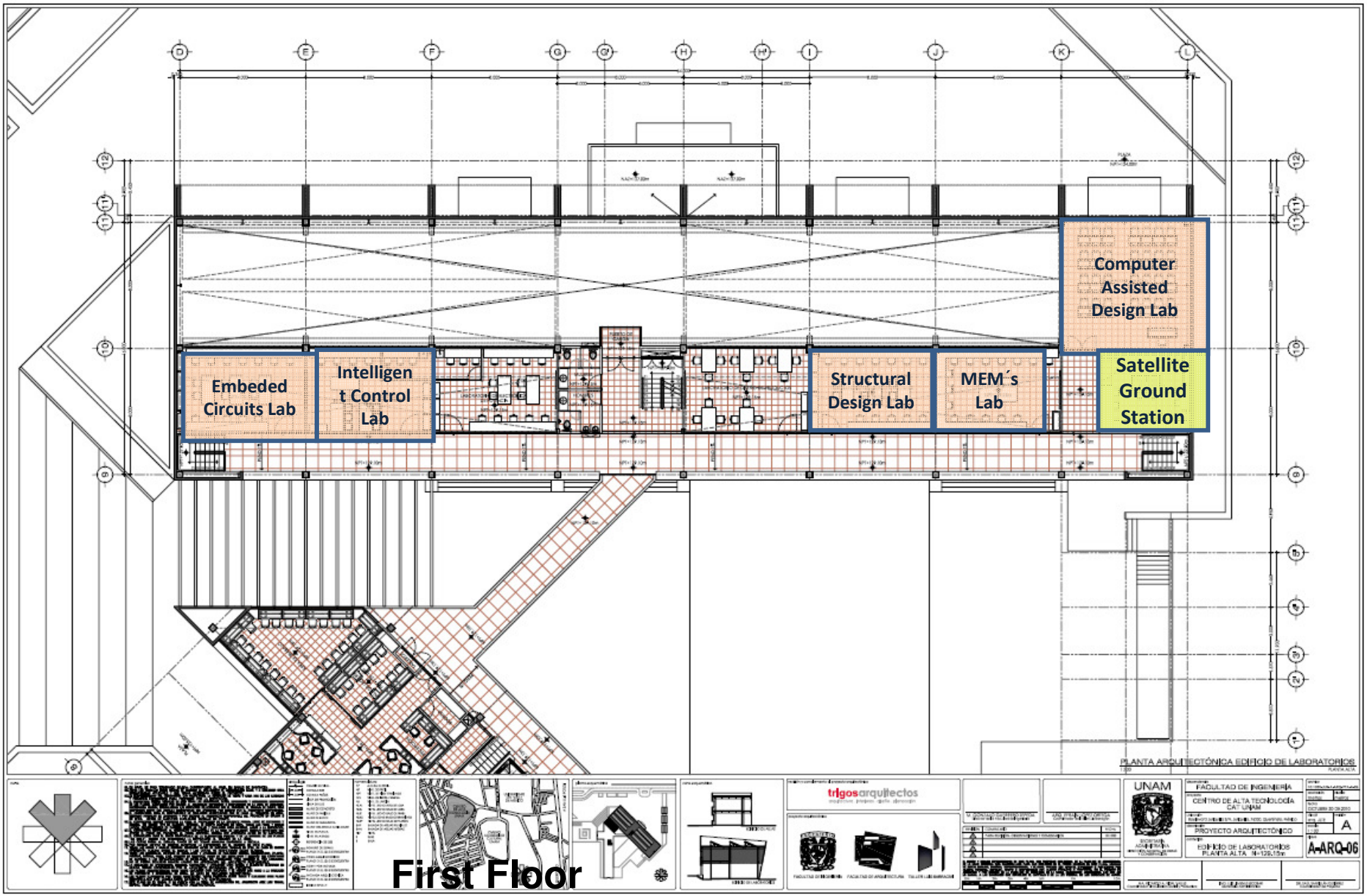


Centro de Alta Tecnología CAT



Ground Floor

Centro de Alta Tecnología CAT



First Floor

CAT (under construction)

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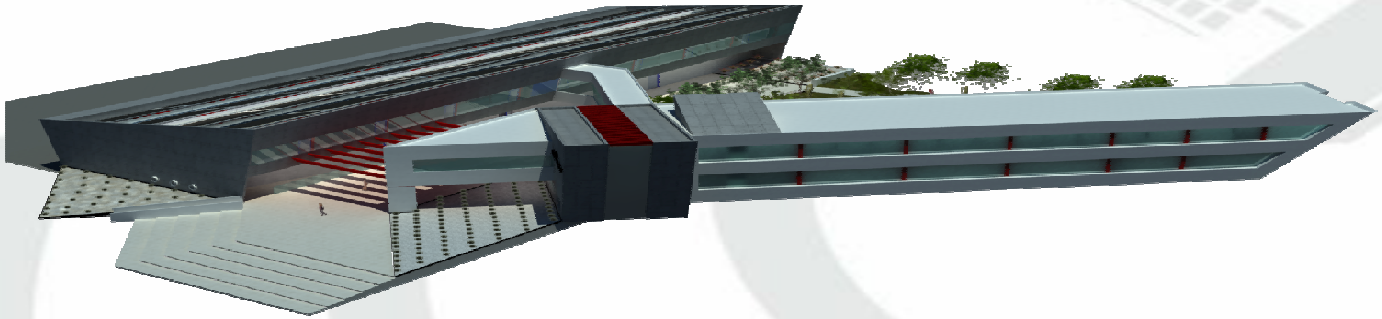


Projects

Reionizationa And Transient Infrared telescope/Camera (RATIR) UNAM I. Astronomy NASA collabration

Projects

CONDOR MISSION

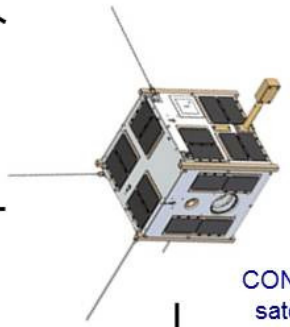
Moscow Aviation Institute
Design, training, assembling.
Liaison with industry

Engineering Faculty UNAM
Participation in design
Data Processing
Assembling Laboratory

CONABIO
Data processing

Geosciences Center UNAM
Data Processing

IG INSTITUTO DE GEOGRAFÍA UNAM



CONDOR satellite

Lavochkin Corporation SA
Basic Platform, instrumentation assembling and tests, training, engineering model assembling in Mexico.

-Data Processing

CICESE
Research Center CICESE (Camera)
-Technology test in space
- Data Processing

國立中央大學 National Central University
Taiwan Central University
Temperature and magnetism ionospheric sensor

Projects :

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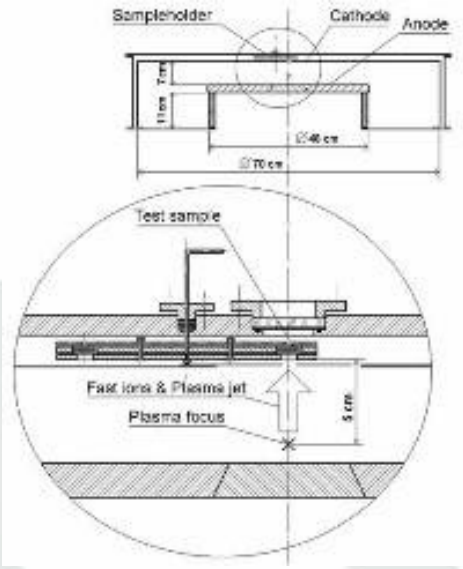
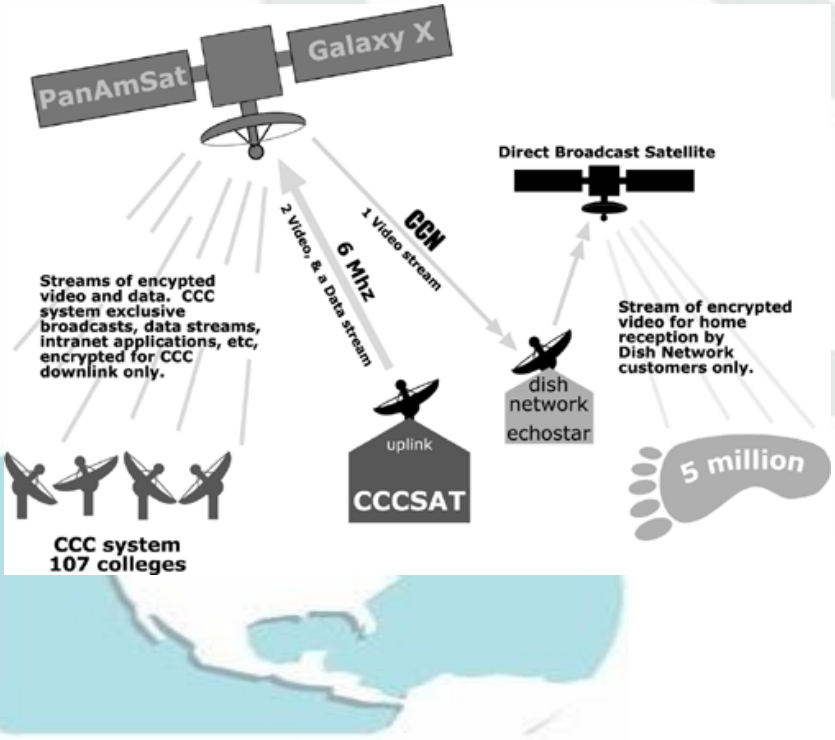




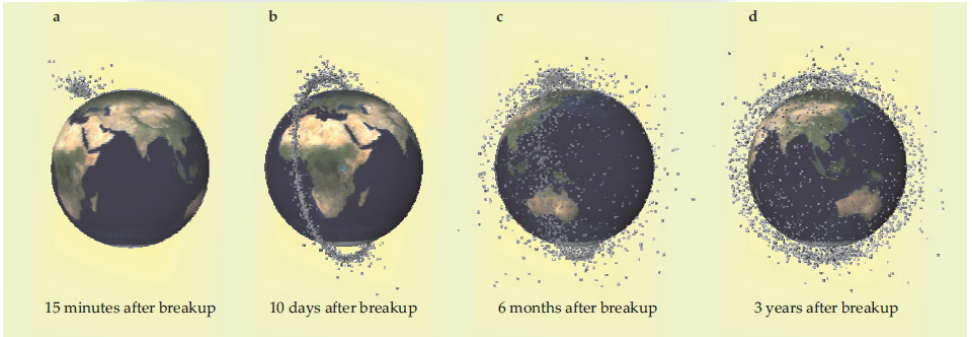
6.Industrial Projects: **ADS System for monitoring UAV´s** *ITELTEQ TCN Quetzal UNAM CICESE*

7.Instrumentation for monitoring ionospheric phenomena IPN UNAM BUAP INAOE

8.HR: Recovering TV antennas for radio clubes ground stations **TCN CINVESTAV UNAM CICESE**

9.Sustainabillity and debris mitigation during space missions study UNAM AEM Red de sustentabilidad CONACYT

10.Developing radiation resistent materials for space aplications espaciales CIMAV UANL CINVESTAV



Projects

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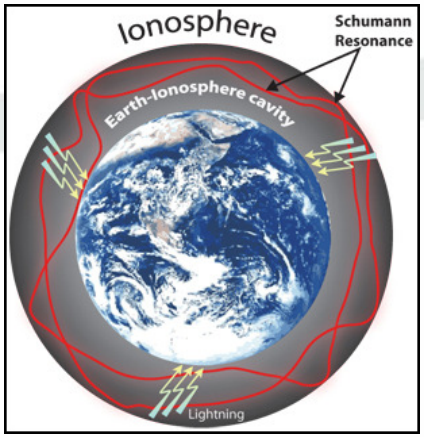
9. **Postgraduate joint program for space technology innovation** CICESE; UNAM; IPN; INAOE; CINVESTAV
10. Monitoring systems for health aplications: **TELEMEDICINE System for CHAGAS disease prevention, education and monitoring**
11. **Space instrumentation: MiniSAR** CICESE INAOE BUAP (Collaboration with de CONACYT disaster

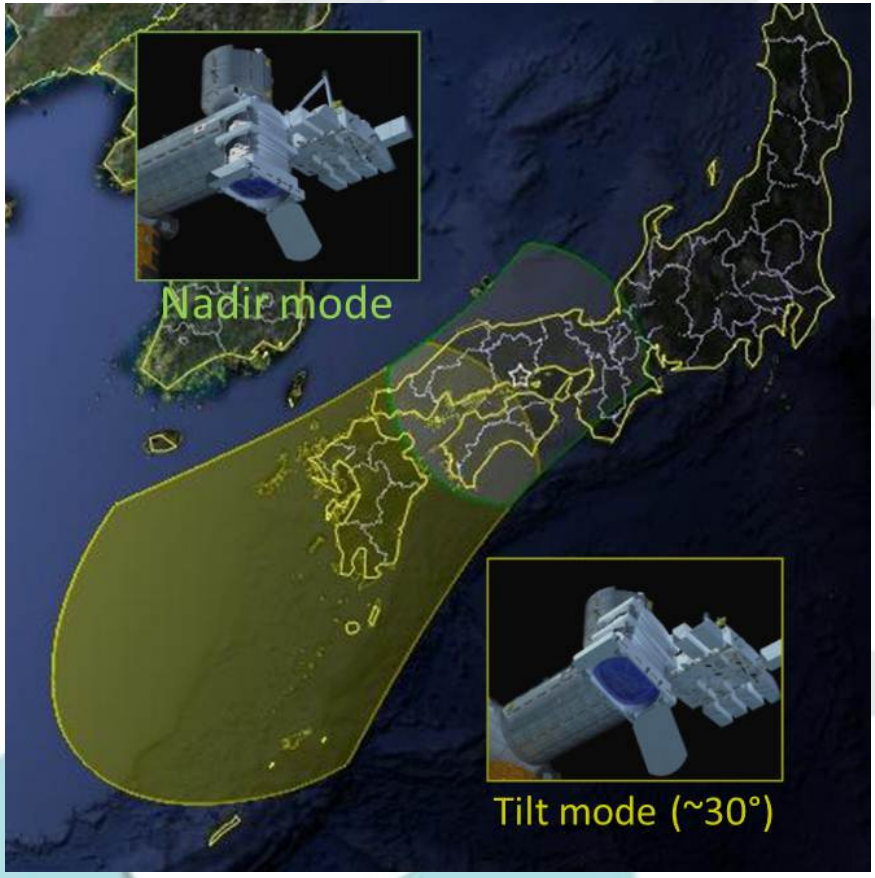
17. Space Science
12. **JEM EUSO**: **Telescope for the ISS, hadrons and high energy particle detection** *UNAM JAXA NASA ESA and other space agencies. Collaboration with CONACYT High energy particles network.*

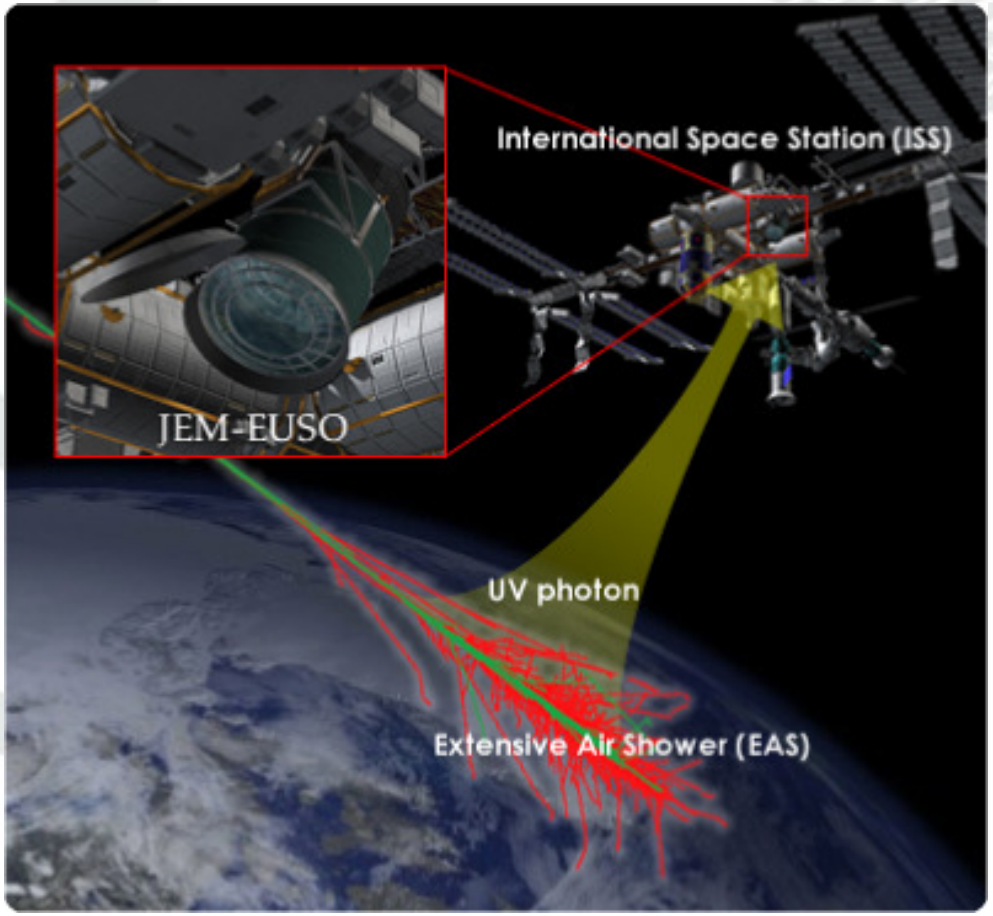
- **RATIR**: Telescope en IR for astronomic observation and other 9 space agencies *UNAM IA NASA*
- **Pinhole camera** BUAP MGU
- Observatory for monitoring fpr Schumann radiation monitoring *UNAM*



Project

JEM EUSO Mission





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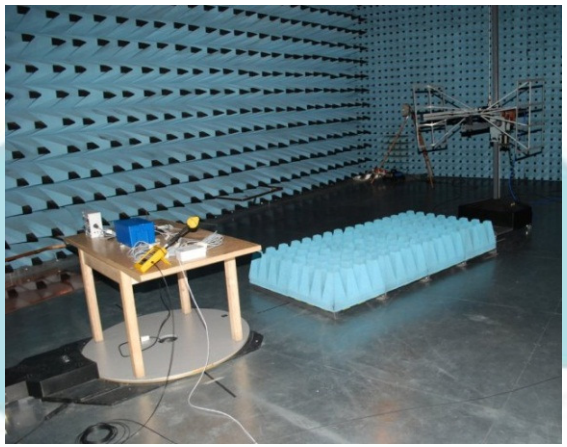
Collaboration for fostering industrial activity on space related with AEM (Plan de Orbita MARIE)

- Projects for industrial development on infrastructure for monitoring, , location applications, ground stations, radios, sensors, software, etc.



- **Development of an organization for certification and testing of software, hardware, space instrumentation, ground stations, etc..**
- Detect bussines opportunities with potential industrial partners (CANIETTI;SE; Consejos estatales,etc)

Conclusions

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- AEM and REDCYTE have 20 seed projects, we expect major R&D funding for at least 10 of them.
- Educational programs are going to get funding from local and federal authorities
- There is strong interest from suppliers of aeronautics, automotive and electronics industry to get into space technology
- **The strategy oriented to help 40 million Mexicans living in poverty to benefit from new opportunities for social applications.**
- **Industrial participation with academia, funded towards innovation programs in collaborative environments.**

The industrial infrastructure and the foreign investment is rapidly and speeding the technology development in Mexico.

It represents a huge opportunity for social welfare from Space R&D.

Networking and associating for solving social problems can help us to get joint research and development with unexpected and positive partners.

Talent oriented program

THANKS FOR YOUR TIME!!!

RedCyTE

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