Indonesian Capacity Building in Space Technology

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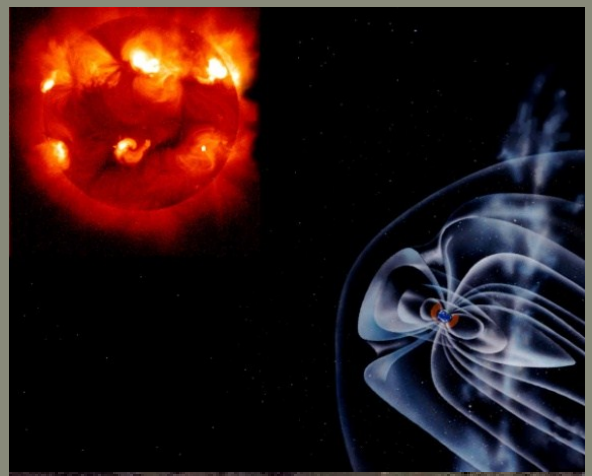
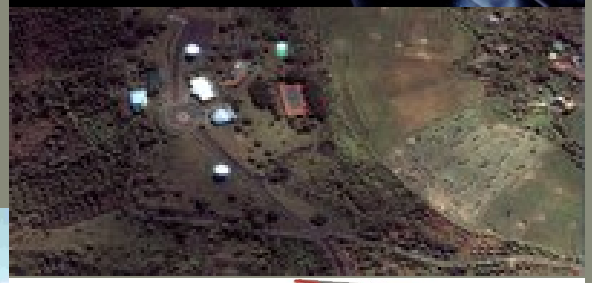
Brief Introduction About LAPAN

- As the Indonesian aerospace agency, LAPAN is responsible in aeronautics and space R&D and lead the national space technology acquisition and development.
- LAPAN has 4 (four) main activities in:
  - Space technology
  - Remote sensing
  - Atmospheric and space sciences
  - Space policy

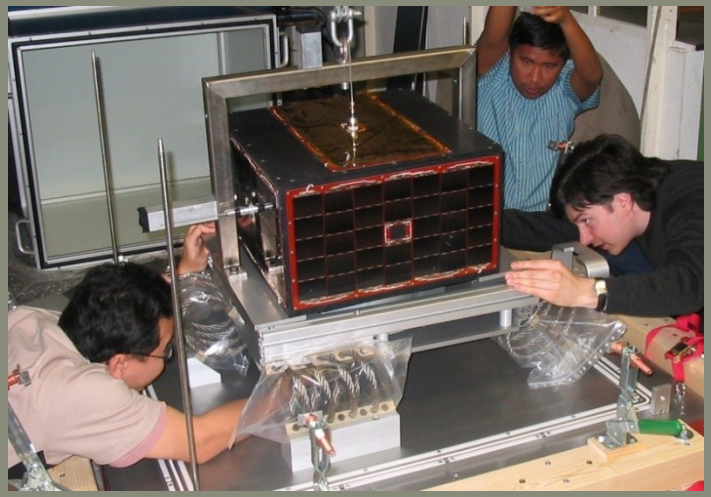




Satellite Development Program

- LAPAN initiated its 1st satellite development program in 2005.
- Small budget leads to micro satellite choice
- Mainly aims for technology transfer through hands-on experience in AIT and operation of a small satellite system
- 4 engineers of LAPAN and 15 faculties and researcher from universities other research institutions are involved in the project

TRACKING SATELIT LAPAN-TUBSAT

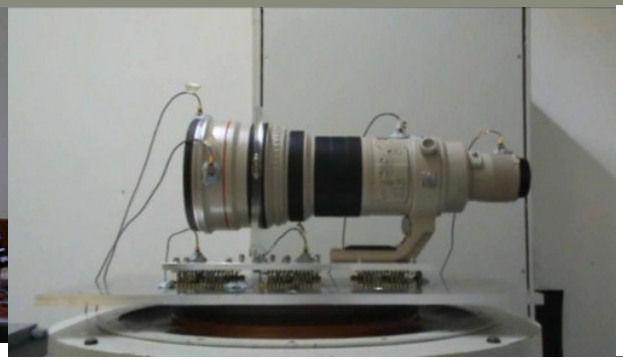
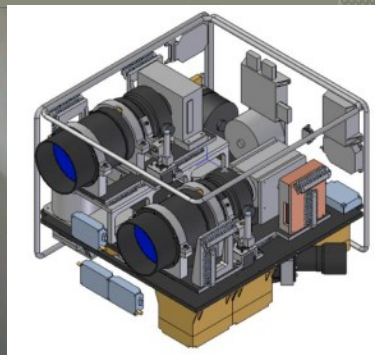


- In the meantime, research is also conducted by LAPAN engineers in indigenous satellite subsystem development
- The first micro satellite LAPAN Tubsat was launched in 2007 and still in-operation today

LAPAN-A2 Satellite Program

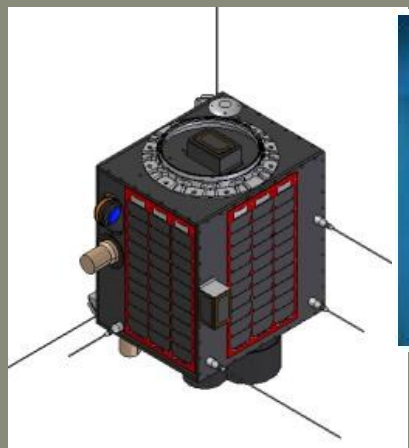
- The Indonesian government agreed to fund the continuation programs
- Two satellite LAPAN A2 and LAPAN A3 are developed in parallel using the same technology as in LAPAN Tubsat
- Partnership with amateur radio organization (ORARI) and AMSAT Indonesia has been arrange to provide means of communication during infrastructure failure in occurrence of natural disaster
- The four LAPAN engineers trained in Germany become lead engineers of the program with more involvement of other LAPAN personnel.
- Communication payload (APRS) are made by ORARI personnel and transfer of knowledge in space technology occur
- AIT activities are conducted in Indonesia

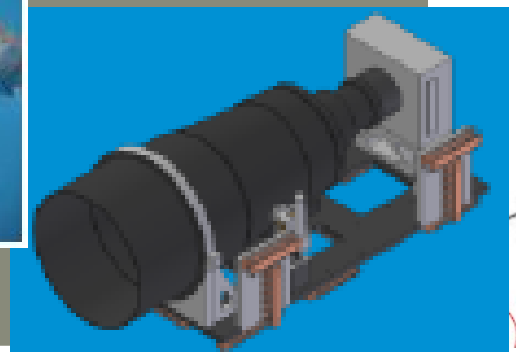


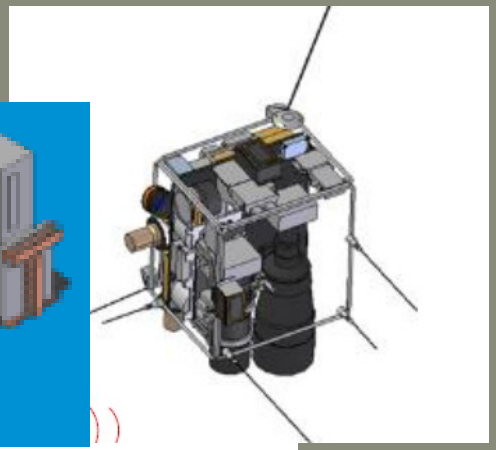



LAPAN-A3 Satellite Program

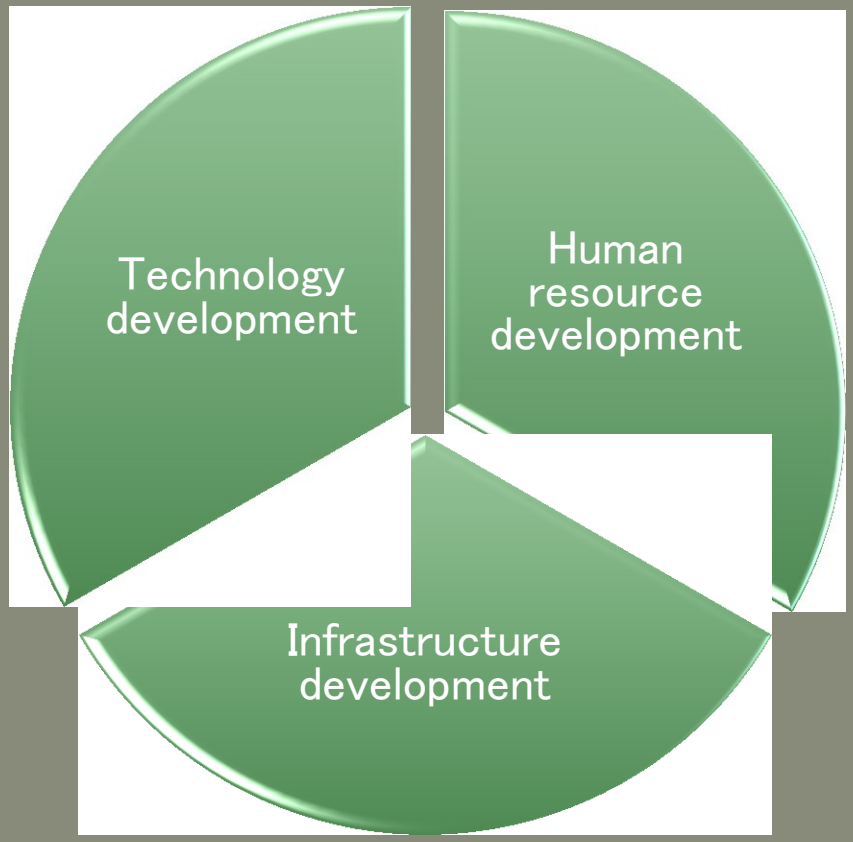
- The Indonesian government agreed to fund the continuation programs
- Two satellite LAPAN A2 and LAPAN A3 are developed in parallel using the same technology as in LAPAN Tubsat
- In partnership with University of Agriculture, LAPAN A3 satellite equipped with 4 channels imager as additional payload for A2 satellite
- Enhancing capacity in imaging payload







Capacity Building Key Components

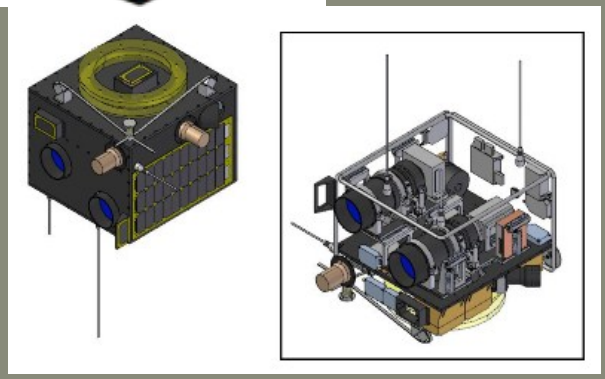


Technology Development Program

LAPAN micro satellite programs

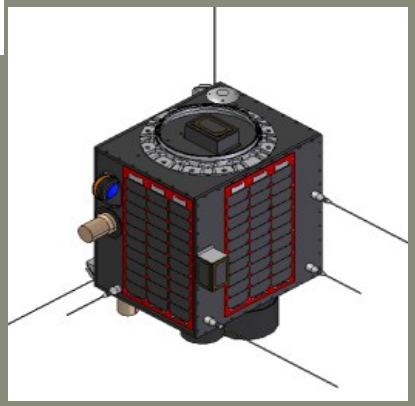
LAPAN – TUBSAT: in co-operation with TU-Berlin

- Surveillance camera
- Launched in 2007
- Focused on technology transfer in satellite development



LAPAN – A2: in co-operation with Amateur radio organization for disaster mitigation

- Surveillance camera , APRS, AIS receiver
- Launched in 2013
- Testing capabilities in indigenous AIT and ADCS components development, RW and STS



LAPAN – A3: in co-operation with Indonesia Agriculture University

- Surveillance camera , APRS, AIS receiver, 4 channel imager
- Launched in 2014
- Testing capabilities in indigenous AIT

Human Resource Development

- Training Programs: regional co-operation under
  - APRSAF: STAR (Japan), GNSS training (India), and Kari international space training (Korea). Some programs are under UN coordination.
- Higher Education Programs: supporting selected personnels in pursuant of higher degree in local and international universities through in-house, national, and international scholarship programs.
  - APSCO: MASTA (Beihang University, China), UN (GNSS)
- University space programs under INSPIRE consortium

Infrastructure Development

- Facility has been evolving from space electronic technology center to assembly, integration, and test (AIT) facility
- Current faclity includes;
  - Structure manufacturing machines
  - Vacuum test
  - Thermal chamber
  - Integration room
  - RF and electronics components development

Capacity building strategy

- More satellite programs is coming in the future after LAPAN A2 and A3 require qualified engineers but also become a chance to improve the skill of its engineer
- Continue in human resource development program by involvement in regional and international training activities
- New space centre consists of design to AIT facilities is planned for LAPAN satellite beyond A3 program
- Supporting university activities in satellite development to improve the quality of its graduates

Conclusion

- Role of a space agency in the building of national capacity is vital.
- In the area of satellite development, capacity building program must involved LAPAN as national space agency but also universities as the main institution which provide the human resource for the future space programs.
- Capacity building has to be an integrated part of the national space development plan

Thank You