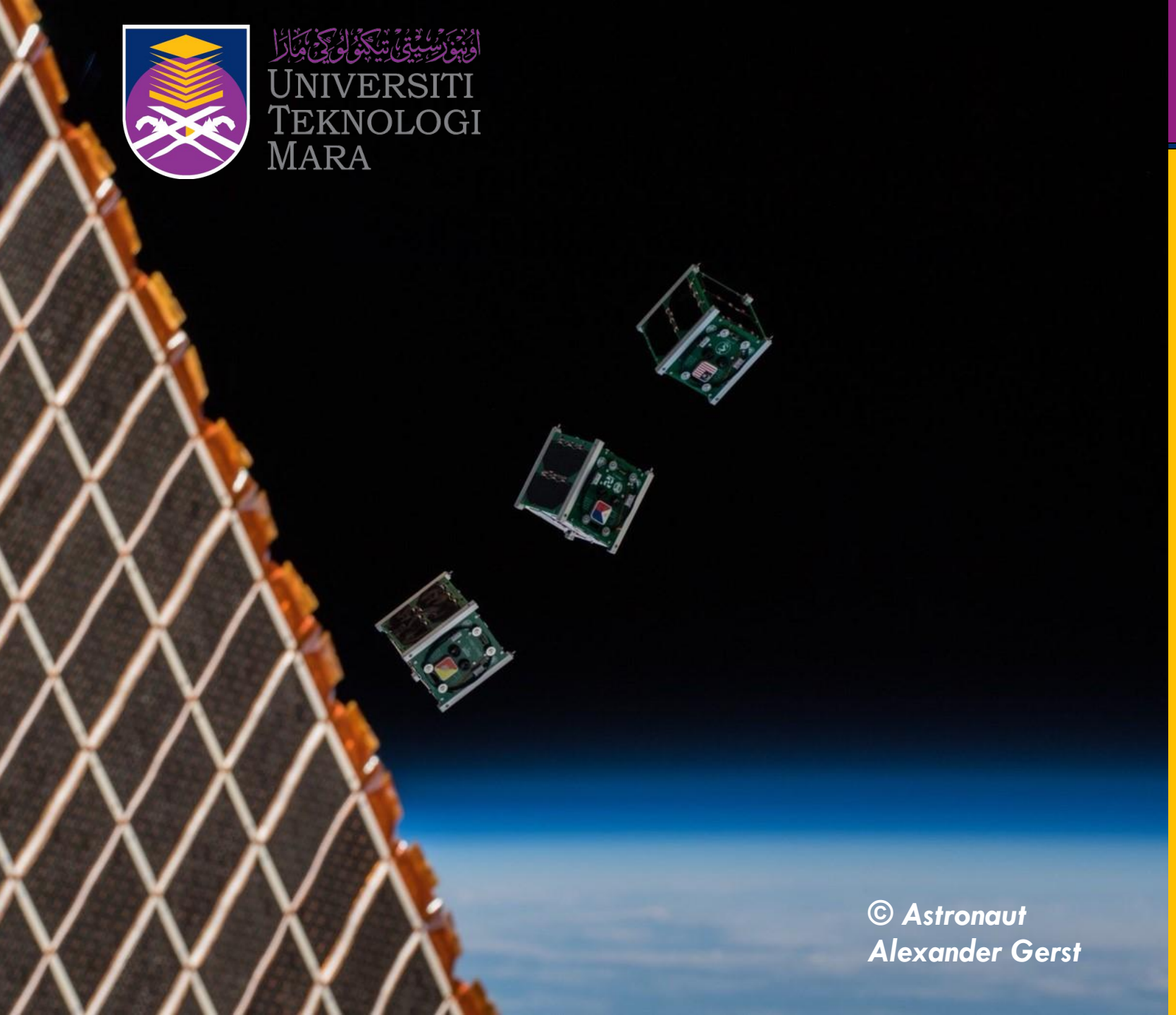


UNIVERSITI TEKNOLOGI MARA

BIRDS BUS OPEN-SOURCE WEBINAR

29TH JAN 2025

Crafting Indigenous Space Program in Malaysia through Multination Collaboration Project - ASEANSAT

Mohamad Huzaimy Jusoh,
Fatimah Zaharah Ali
Universiti Teknologi MARA (UiTM),
MALAYSIA

PROGRESS OF SPACE PROGRAMMES IN MALAYSIA

1988
MACRES establishment

2007
Malaysian astronaut travelled to ISS

2011
RAZAKSAT launched

2016
Kick-off UiTMSAT-1 through BIRDS-2

2017
- National Space Policy created
- USM – ANGKASA MOU for MYSat project
- Centre for Satellite Communication (UITMSAT) establishment

2018
- UITMSAT-1 launched
- InnoSAT-2 launched
- Space entrepreneur start-up

2019
- ARSM + ANGKASA MYSA
- MiSI establishment
- UNISEC inauguration

2020
A bill to establish Malaysian Space Institution was tabled

2021
- Malaysian Space Institution was approved
- Kick-off ASEANSAT Project

ASEANSAT

2022
- National remote sensing satellite project
- Preparation of action plans for National Space Policy 2030

UITMSAT-1: THE FIRST MALAYSIAN NANOSATELLITE

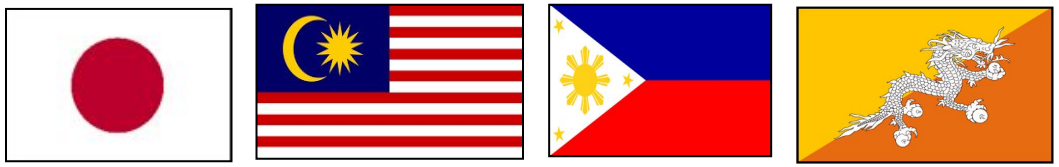
UITMSAT-1 deployed into space in 10th Aug 2018

Launched by SpaceX CRS-15 Falcon 9 to ISS

UiTMSAT-1 is a part of **BIRDS-2** project, **the Joint Global Multi-nation BIRDS (JGMNB)** since 2016

Constellation of three identical 1U CubeSats:

1) UiTMSAT-1 (Malaysia)
2) MAYA-1 (Philippines)
3) BHUTAN-1 (Bhutan)



Specifications:

- Dimension: 10 x 10 x 11.4 cm
- Weight: 1.13 kg
- Altitude: 400 km
- VHF-UHF amateur radio frequency band
- Carried 6 missions

UITMSAT-1 ON THE NEWS & MEDIA COVERAGE

UiTM reaches milestone in space

Varsity's nanosatellite launched into orbit

By REBECCA RAJAENDRAM
educate@thestar.com.my

Blast off: Dr Hassan Said (right) watching the launch with (from left) Prof Dr Mohad Nasir Taib and Prof Dr Mohamad Kamal Harun in Shah Alam.

SHAH ALAM: Universiti Teknologi Mara (UiTM) can proudly say that it is the first local university which has a nanosatellite in space.

The *UiTMSAT-1* is being transported to the International Space Station on board the SpaceX's Dragon spacecraft which was launched from Cape Canaveral Air Force, Florida, in the United States yesterday . The commercial resupply mission is expected to reach the space station with its payload, including *UiTMSAT-1*, on July 2.

UiTM vice-chancellor Prof Emeritus Datuk Dr Hassan Said said *UiTMSAT-1* marks another milestone for the public university and is paving the way for Malaysia to become "a space-faring nation".

"We didn't think we could do it," he said before watching the live feed of the launch at the Shah Alam campus.

Prof Hassan added that this is also a significant moment for Malaysia.

The nanosatellite is the product of Malaysia's collaboration with Japan, Bhutan and the Philippines under a project called Joint Global Multi-Nation BIRDS-2 Project.

Bhutan and the Philippines also developed a nanosatellite each, which are also on the way to the International Space Station together with *UiTMSAT-1*.

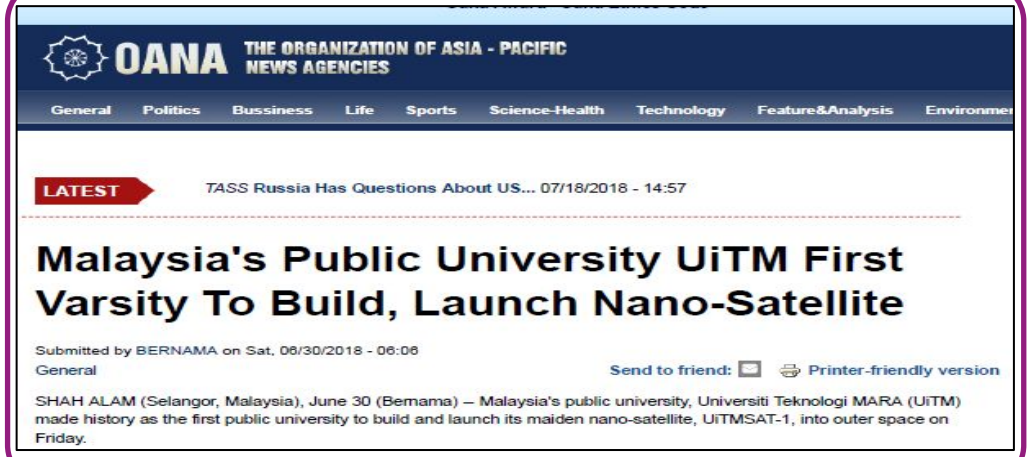
The nanosatellites or CubeSats were developed and tested by 10 postgraduate students – two Malaysians, two from the Philippines, three Japanese and three from Bhutan – at the Laboratory of Spacecraft Environmental Interaction Engineering, Kyushu Institute of Technology, Japan.

The Malaysians on the team, UiTM postgraduate students Syazana Basyirah Mohammad Zaki and Muhammad Hasif Azami, have been working on the project since December 2016.

The nanosatellite is a low-cost miniature instrument for space research. The data collected can be used for research, and also pave the way for industry and government-led initiatives, said UiTM Centre for Satellite Communication director Assoc Prof Mohamad Huzaimy Jusoh.

Each CubeSat, measuring 10cm× 10cm×10cm and weighing 1kg will be sent into orbit from the International Space Station in mid-August.

* *See full report in StarEducate next Sunday.*



Big step with small satellites

Varsity impresses with collaboration of and launch of CubeSats

By SANDHYA MENON
newsdesk@thestar.com.my

Tiny space traveller: Muhammad Hasif (right) shows a prototype of the UiTMSAT-1 to Dr Siti Hamisah after watching the launching of the nanosatellite at UiTM, Shah Alam.

SHAH ALAM: Malaysia has created another milestone with the deployment of its first nanosatellite in space.

Universiti Teknologi Mara's UiTMSAT-1 was deployed from the International Space Station on Friday.

"This is history for Malaysia. UiTM will act as a catalyst for capacity building and to boost research within the space industry," Education Ministry's Department of Higher Education director-general Datin Dr Siti Hamisah Tapsir said after watching the live feed of the launch at the Shah Alam campus.

The UiTMSAT-1 is a product of Malaysia's collaboration with Japan, Bhutan and the Philippines under an initiative called the "Joint Global Multi-Nation BIRDS-2 Project".

Bhutan and the Philippines also developed a nanosatellite each.

Dr Siti Hamisah said the ministry would provide funding to universities to carry out more research in the field but needed the support of the industry.

"The government alone cannot afford to sponsor all research grants," she said.

Describing the achievement as "impressive", Dr Siti Hamisah said it showed that Malaysian postgraduate students, together with their project supervisors, were able to contribute their knowledge and skills in big projects.

UiTM deputy vice-chancellor (academic) Prof Dr Mohamad Kamal Harun said the varsity was committed to producing technology-oriented products through researches.

"UiTMSAT-1 is just the beginning. We are stepping our feet in space-faring community.

"Next, we are going to anchor ourselves and build a harbour in nanosatellite technology," he said.

Speaking from the Japan Aerospace Exploration Agency, UiTM vice-chancellor Prof Emeritus Datuk Dr Hassan Said thanked everyone involved in the project.

The nanosatellites, or CubeSats, were developed and tested by 10 postgraduate students – two Malaysians, two from the Philippines, three Japanese and three from Bhutan – at the Laboratory of Spacecraft Environmental Interaction Engineering, Kyushu Institute of Technology, Japan.

The Malaysians on the team, UiTM postgraduate students Syazana Basyirah Mohammad Zaki and Muhammad Hasif Azami, have been working on the project since December 2016.

Muhammad Hasif, 27, found it hard to put his emotions into words.

"I felt very nervous watching the deployment.

"Anything can happen at that moment," he said.

"We have been working on this project for over a year.

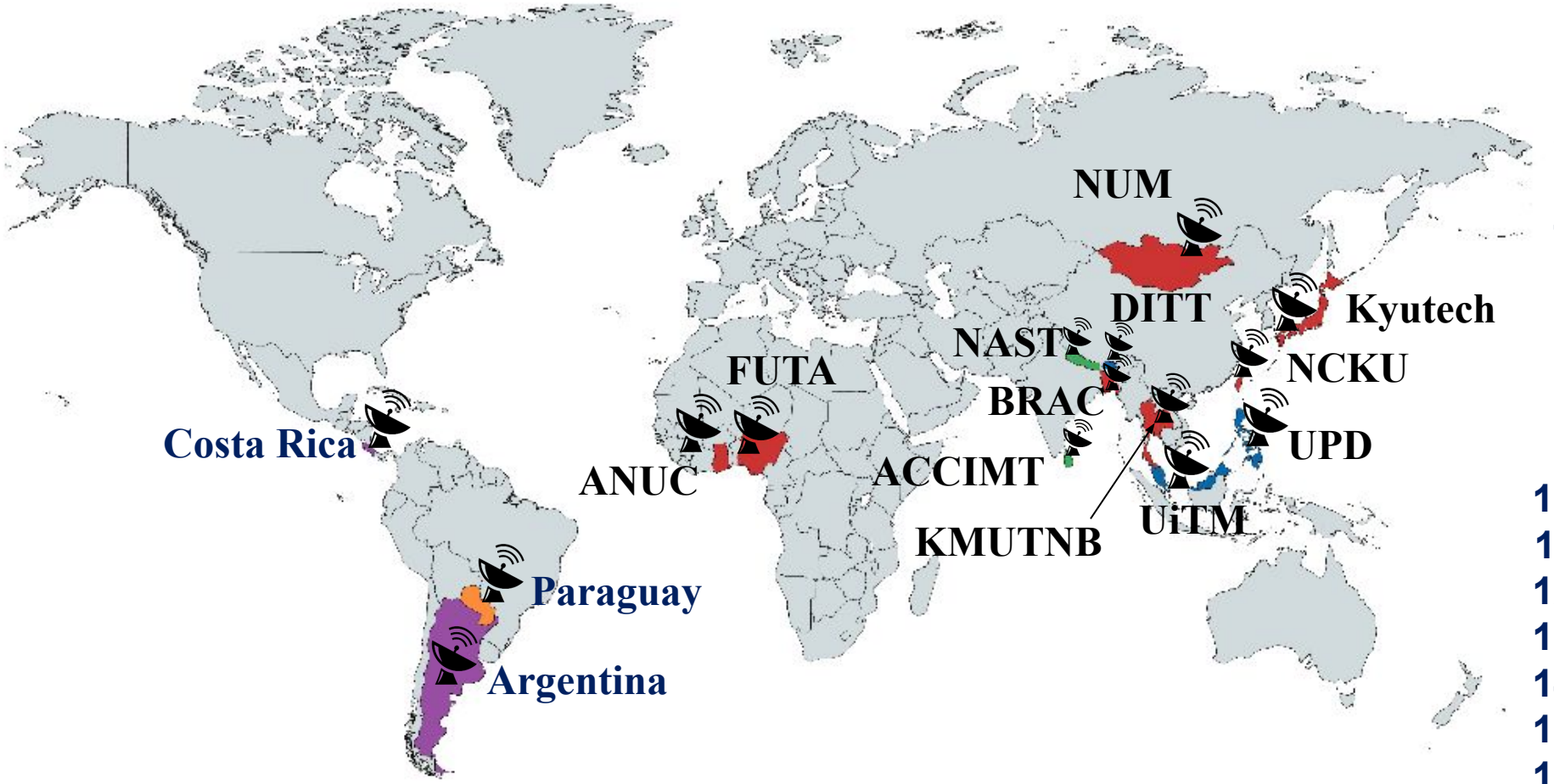
"I hope this will propel the Education Ministry and Ministry of Energy, Science, Technology, Environment and Climate Change to support similar projects," he said, adding that more universities should collaborate on such initiatives.

The nanosatellite is a low-cost miniature instrument for space research.

Watch the video thestartv.com

Media coverage: **Worth more than USD 120k**

INTERNATIONAL COLLABORATORS: BIRDS GROUND STATION NETWORKS



15 Ground Stations Members

BIRDS Countries:

1) Japan (Kyutech)
2) Malaysia (UiTM)
3) Philippines (UPD)
4) Bhutan (DITT)
5) Nepal (NAS)
6) Bangladesh (BRAC)
7) Zimbabwe
8) Thailand (KMUTNB)
9) Mongolia (NUM)
10) Taiwan (NCKU)
11) Nigeria (FUTA)
12) Ghana (ANUS)
13) Sri Lanka (ACCIMT)
14) Costa Rica
15) Paraguay
16) Argentina

https://mapchart.net

CURRENT PROJECT

- Kick-off: Feb 2021
- Development period: ~20 months
- Expected launching: Second quarter of 2023

UNIVERSITY OF PERPETUAL HELP SYSTEM DALTA LAS PIÑAS CAMPUS
www.perpetualdalta.edu.ph

KMUTNB

Kyutech
Kyushu Institute of Technology

AGENSI ANGKASA MALAYSIA

ASEANSAT: PROJECT OVERVIEW

COLLABORATION

Collaboration with multi-nation institutions (ASEAN)

- UiTM, Malaysia
- KMUTNB, Thailand
- UPHSD, Philippines
- Ministries/Agencies

PROJECT DURATION

2 years

FUND FROM MINISTRY

Fund from Ministry of Science, Technology & Innovation, Malaysia

PARTICPANTS

Students/ Attachments from the representative countries/ agency:

- Malaysia – 4 students
- Philippines – 3 students
- MYSA – 4 staff

FIRST ASEAN SATELLITE

First ASEAN Collaboration (for South-East Asian Institution) Nanosatellite project

National Space Agency & Industries

- Technical support, consultancy, facilities for pre-test
- Technical management (licensing, inter-government link)

Stakeholders

- Cost & expertise
- Send student to join the project

Kyutech/UPHSD/ KMUTNB

- EM & FM testing and validation

Students

- Stationed in UiTM for ASEANSAT development
- Experience hands-on training-BIRDS bus systems

ASEANSAT: CHALLENGES AND STRATEGIES

Stakeholders

- Government
- University
- Industry & Community
- Other collaborators

ASEANSAT

Global Technology
Locally rooted

Financial

- Government
- University
- Industry
- Other collaborators

Subsystems

- BIRDS Open Source
- Improvised-based on existing subsystems
- COTS
- Collaborators

Team members & experts

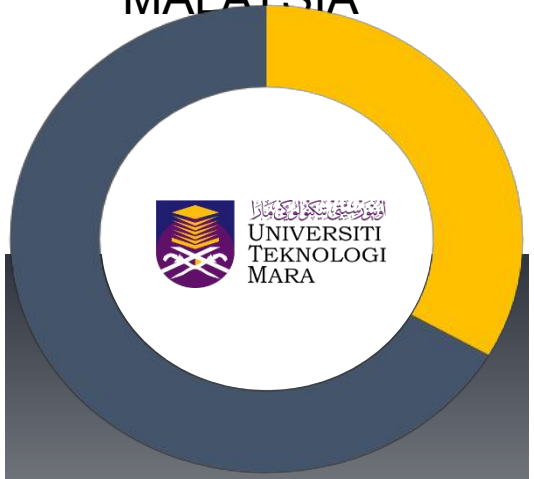
- Internal
  - Students
  - Lecturers
  - Management
- External
  - Gov. agencies
  - Collaborators
  - Industries

Testing & Launching

- Local facilities (Univ's, Gov. agencies, industries)
- Collaborators
- Launching: J-Cube, Shared-rocket launching

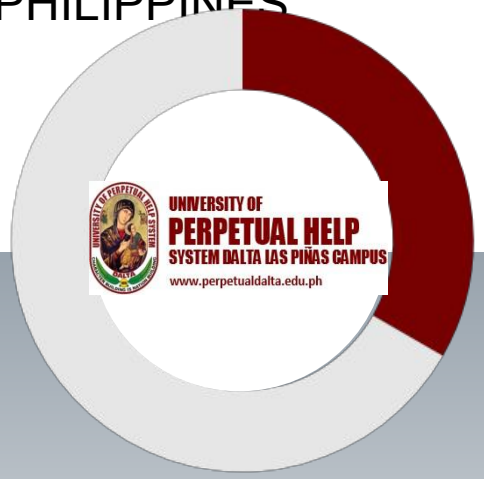
ASEANSAT: STAKEHOLDERS CONTRIBUTION BREAKDOWN

UiTM, MALAYSIA



- Hardware procurement
- Development, integration and testing
- Launching contract
- Frequency coordination
- Financial contribution for hardware, integration and testing.

UPHSD, PHILIPPINES



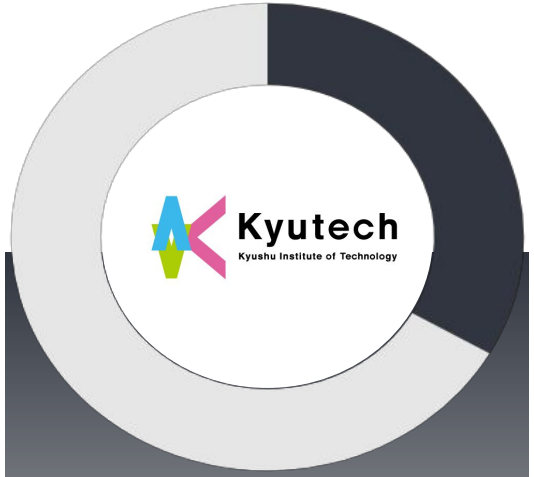
- Provide 3 postgraduate students for satellite development
- Satellite operation
- Secure radio license
- Registration of space object to UNOOSA
- Financial contribution for hardware

KMUTNB, THAILAND

- EM integration and testing
- Satellite operation
- Assist in technical development

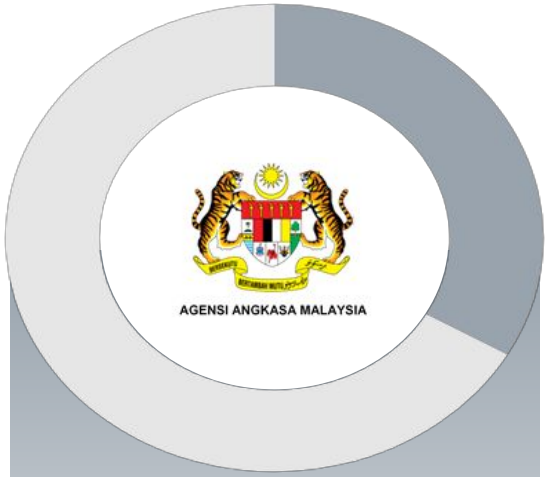
ASEANSAT: STAKEHOLDERS CONTRIBUTION BREAKDOWN

KYUTECH, JAPAN



- Provide facilities for FM space environment testing.
- Assist in securing launcher and launching contract (subsidized ¥ 2M for final integration, safety review process and launching coordination)

MYSA, MALAYSIA

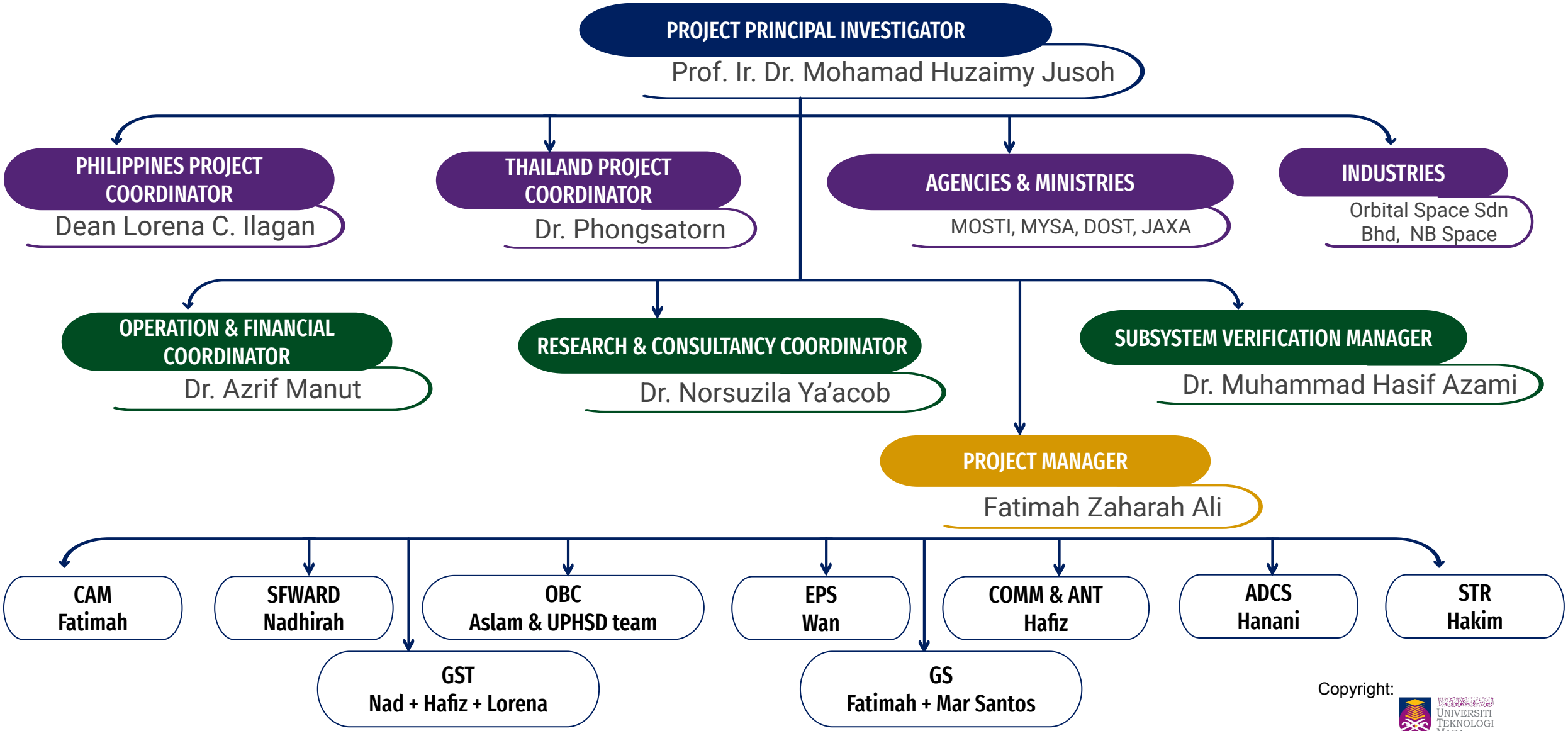


- Provide 1 part-time attachment & 3 standby staff.
- Provide facilities for EM space environment testing.
- Assist in frequency allocation.

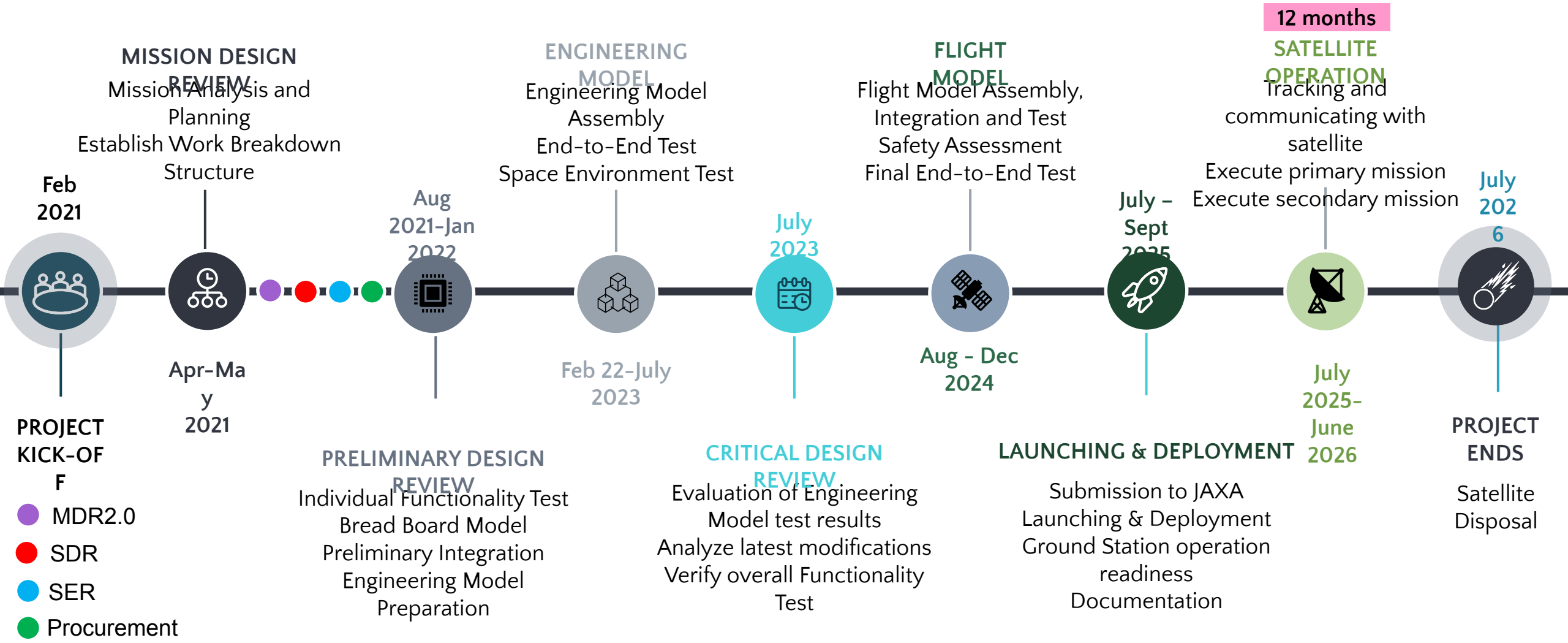
MOSTI, MALAYSIA

- Funding RM 500k to UiTM for the ASEANSAT FM Nanosatellite project

ASEANSAT: ORGANIZATION CHART/ WBS



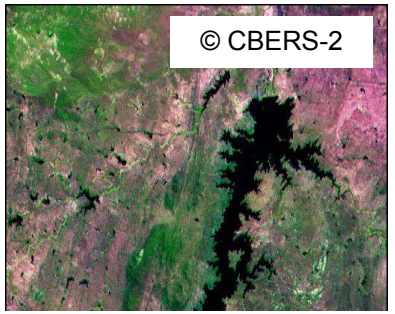
ASEANSAT: PROJECT TIMELINE



ASEANSAT: MISSIONS & STRUCTURE

- Mass ~ 1 – 1.33 kg
- Size ~ 10 x 10 x 11.35 cm
- Power ~ 1 – 2.5 W
- UWE standard interface

Main Mission:
Earth Observation Mission
High ground resolution camera payload



GSD: 20 m @ 800 km

GSD: 16 m @ 700 km

Secondary Mission:
Amateur Radio Tracking System Mission

Amateur radio communication system – FM Transponder / Digipeater

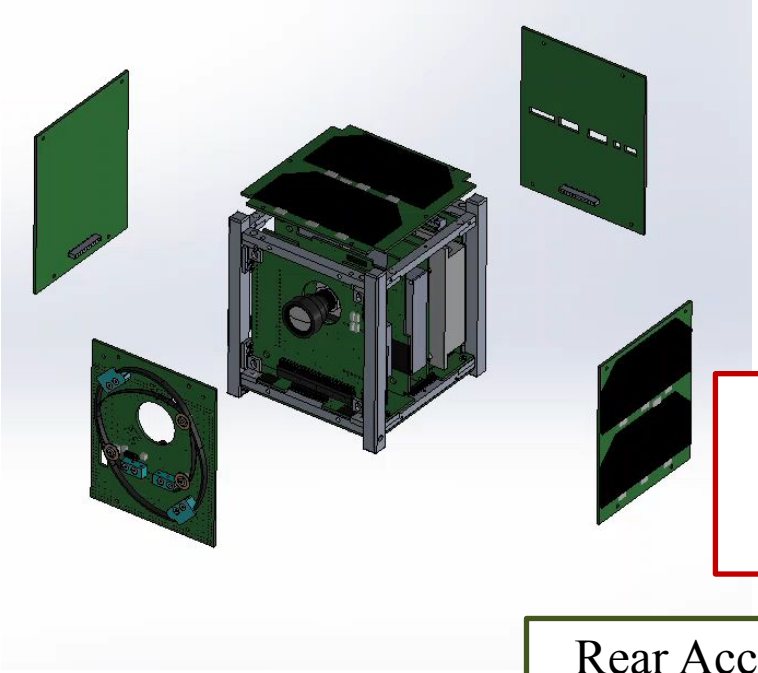
Secondary Mission:
Store-and-Forward Mission

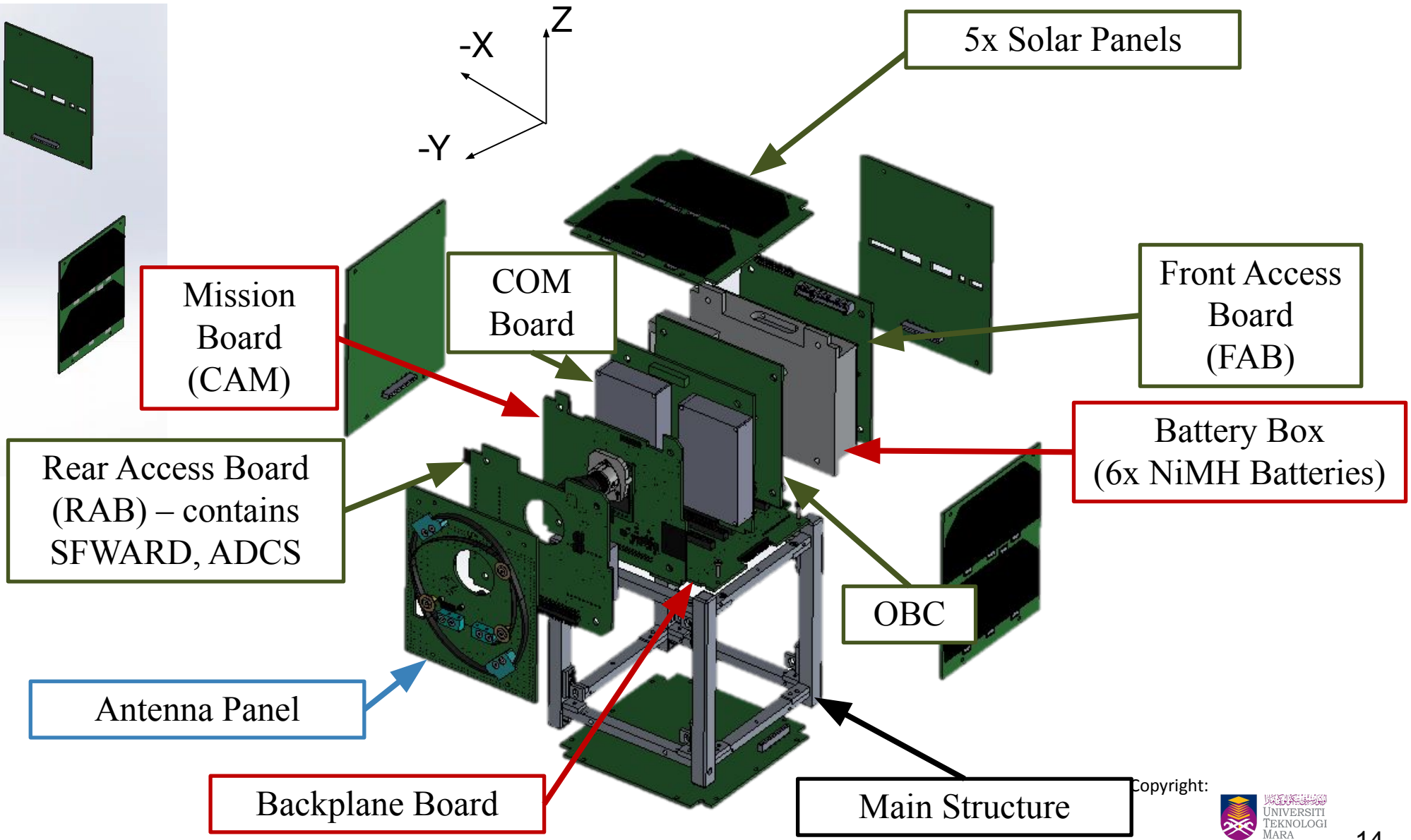
Agriculture monitoring system

UiTMSAT-2:

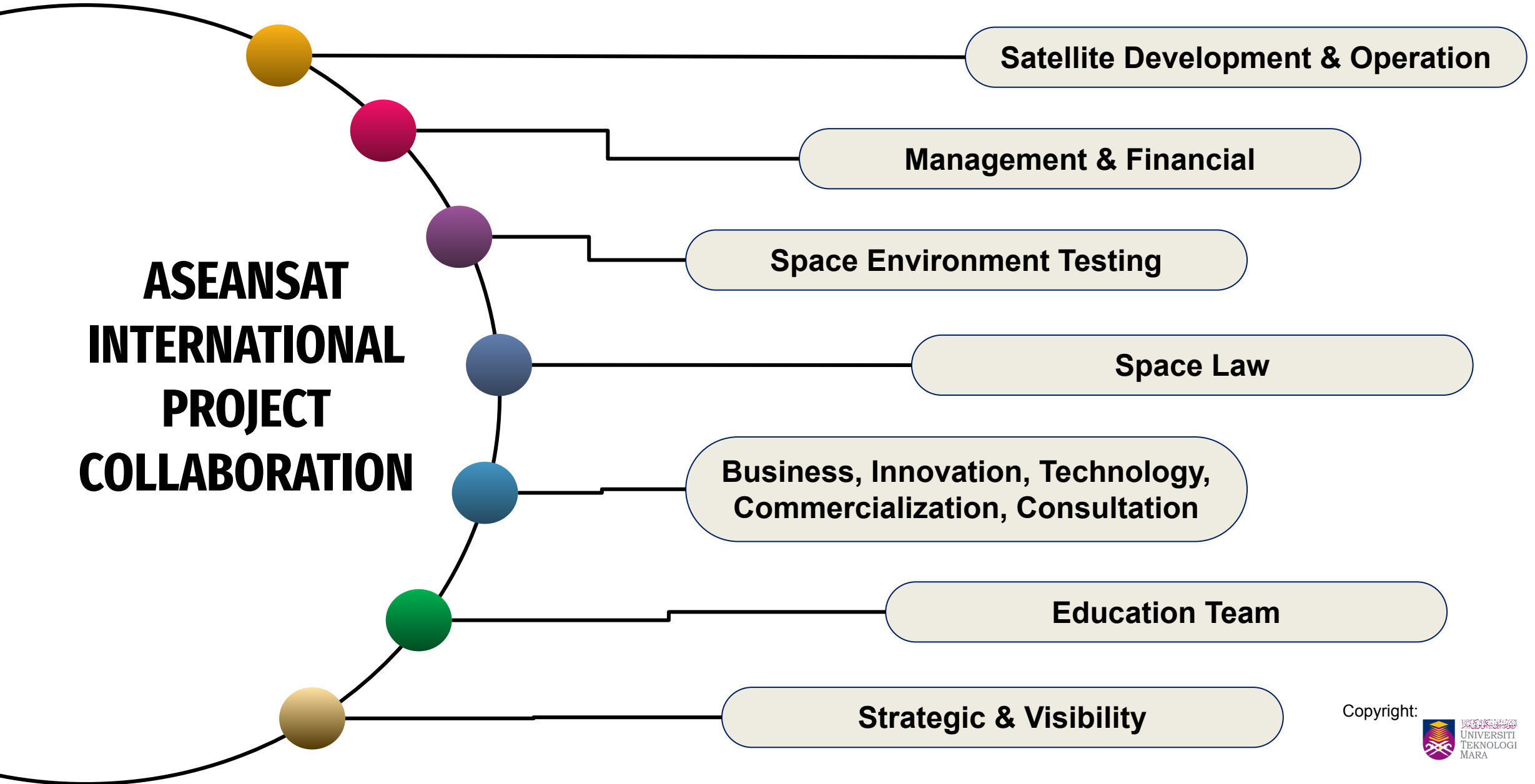
- Resolution: 2592x1944 pixels array (5 MP)
- Spatial: GSD ~16 m @ 400 km
- Spectral: RGB (λ: 0.4 – 0.7 nm)
- Radiometric: 8 – 10 bits image data
- Temporal: 4 ~ 6 times/day (6~8 minutes/pass)
- Swath: FOV ~6° (41.5 x 31 km)
- Size ~1.152 MB
- JPEG compression

ASEANSAT: EXPLODED VIEW





ASEANSAT: PROJECT OPERATION SYSTEM



ASEANSAT: PROJECT IMPACTS

Stakeholders	Benefits
Government/ Ministry	• G2G collaboration for space project • Space technology advancement • Towards IR 4.0 • Ministry of Environment and Water, Ministry of Agriculture and Food Industries, MOSTI, Ministry of Home Affairs
Related industries	• Space-grade products – solar panel, electronic manufacturing • Satellite image for analysis – Department of Survey & Mapping Malaysia, Oil & Gas Industries, Maritime • Smart Agriculture
Academic institutions	• International grant • New academic syllabus • Satellite image for advanced research
Employer	• Skilled employee • New startup for space based industries
Student	• Advanced engineering expertise • International mobility
Community/ End-user	• Solve local issue through satellite image data • Amateur radio community for alternative communication

Promote international collaboration

Stimulate space related technologies

Data sharing from satellites/ground station

UNIVERSITI TEKNOLOGI MARA

Global Prosperity through Sustainable Development: Uniting Efforts for an Inclusive and Sustainable Future

THANK YOU