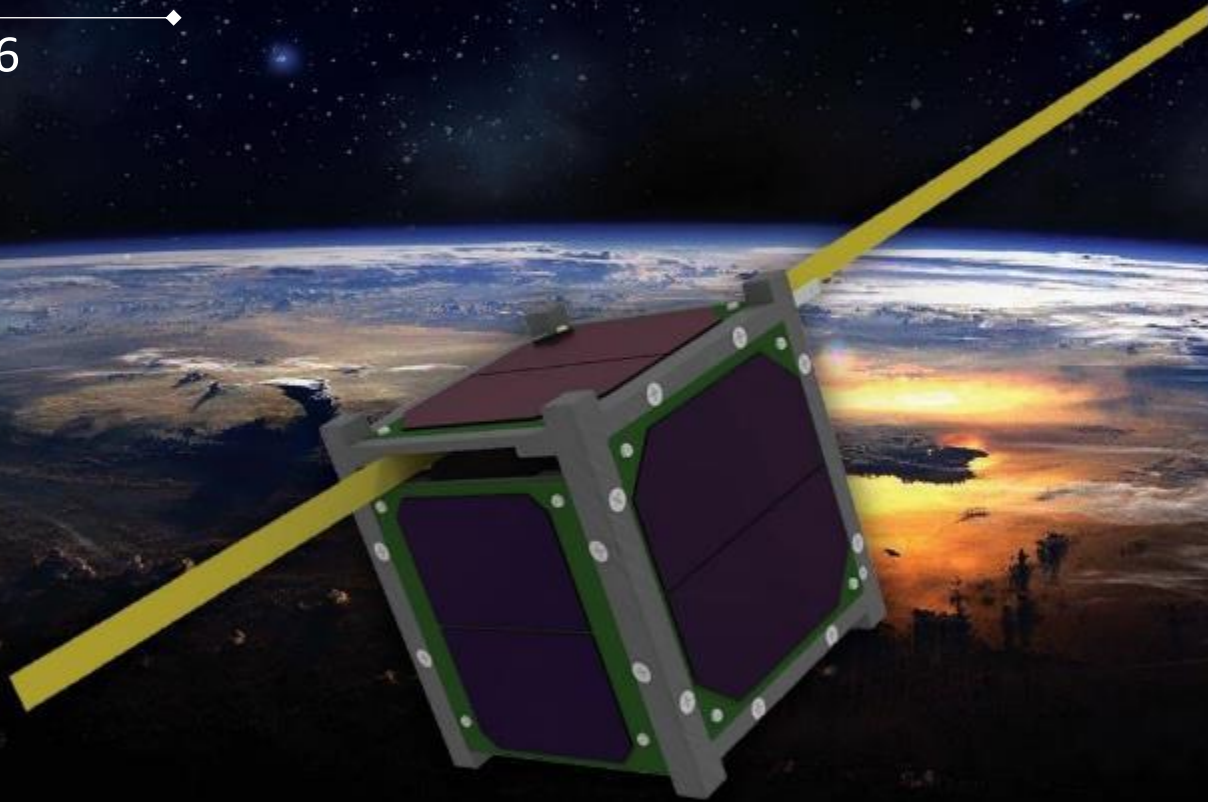


THE DEVELOPMENT OF SURYA SATELLITE - 1: PIONEERING INDONESIA NANOSATELLITE

August 15th, 2026



THE 71ST VIRTUAL UNISEC GLOBAL MEETING



Outline

1. Background & Mission

2. Challenge

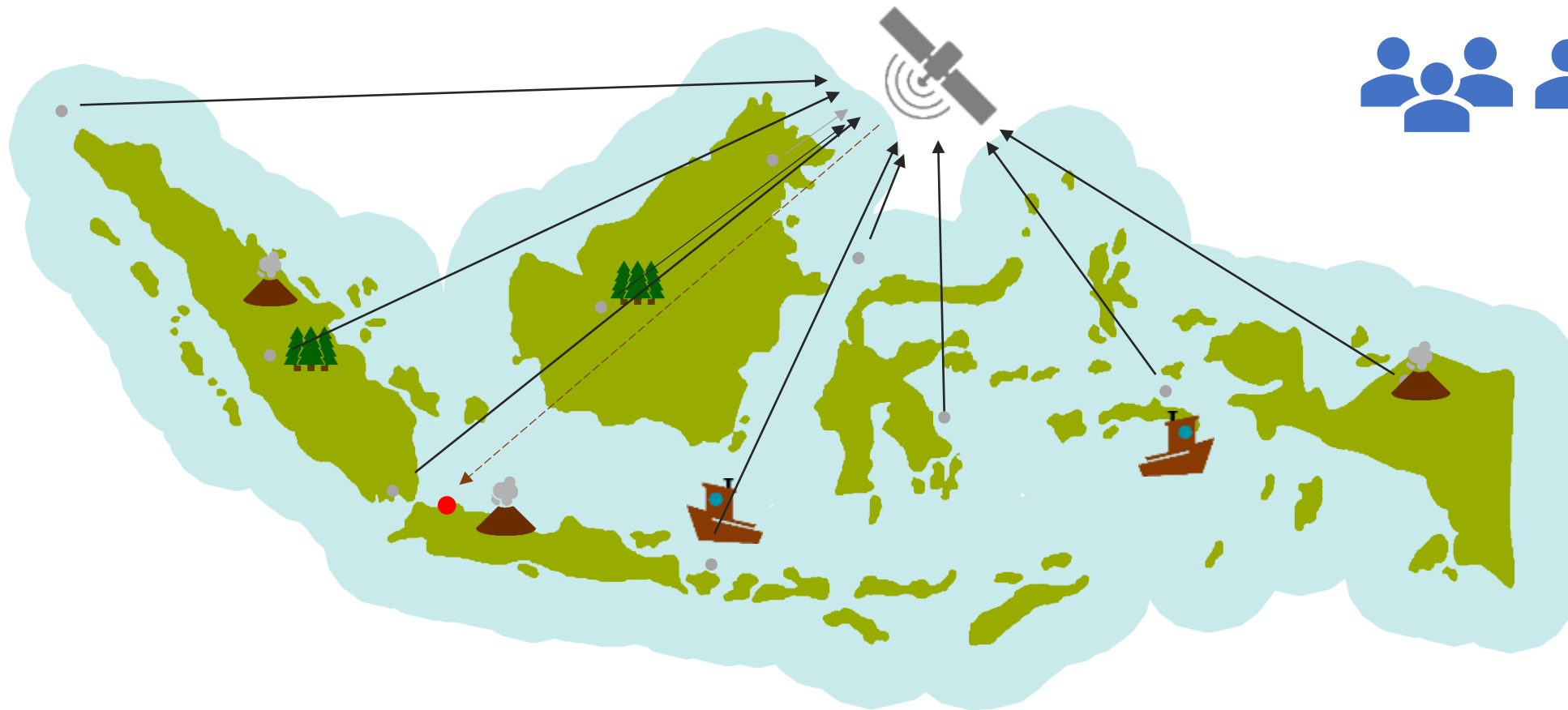
3. Major Milestone

4. Result & Conclusion

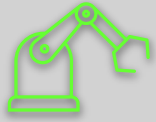
Background

It is hard fact Indonesia need satellite to manage vast area of archipelago!

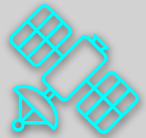
But capacity building is a big challenge for us



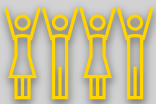
Missions



SS-1 is an initiative to **build the first Nano Satellite** in Indonesia



The project aims to develop capability in satellite technology and give a **long-range emergency communication** service from space



To disseminate **space utilization awareness** to public commercial and academics in Indonesia

Surya Satellite – 1

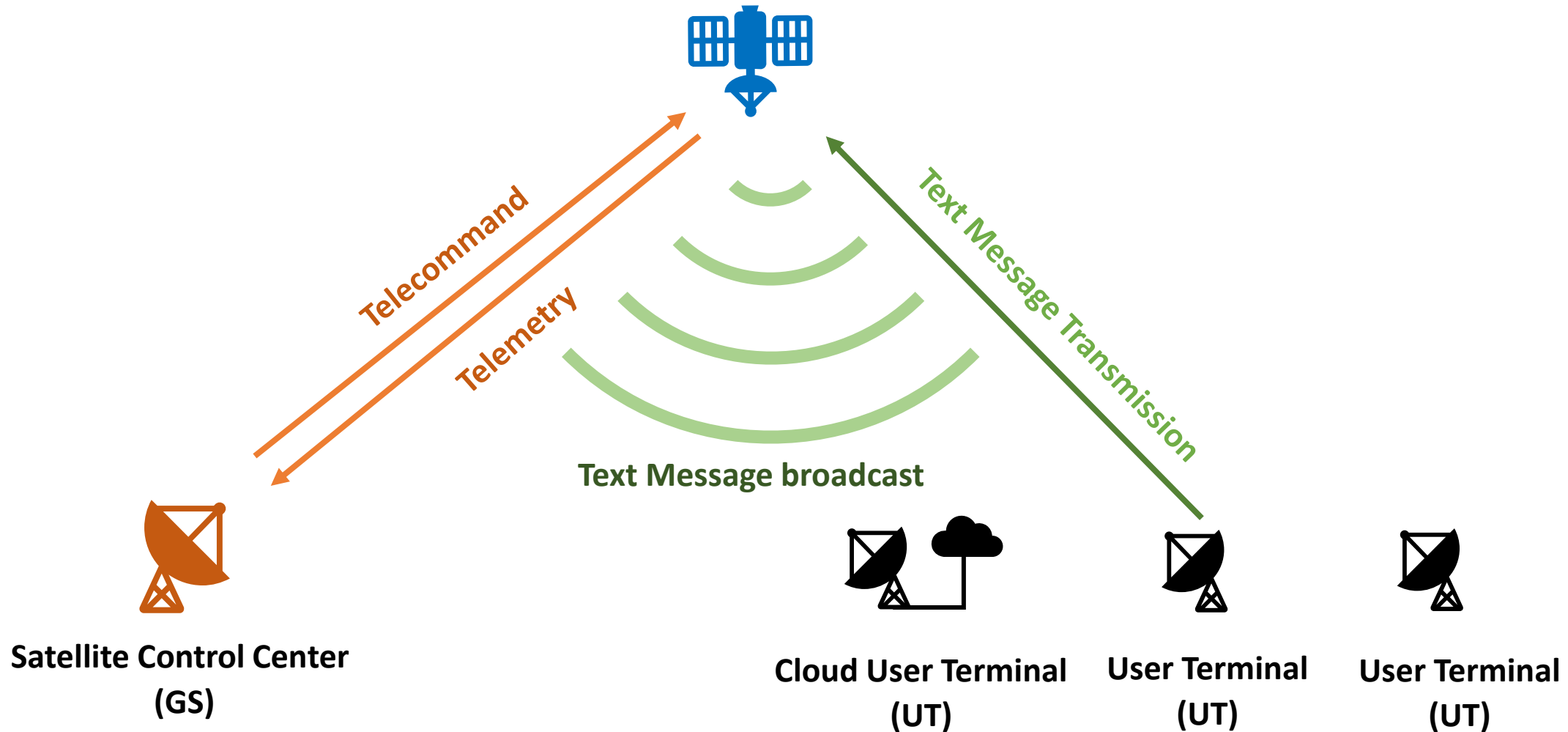
SS-1 designed based on JEM
Payload Accommodation Handbook

It utilize two-ways text message
communication payload for amateur
radio enthusiast.

System Specifications	
Bus	1U
Mass	1.124 kg
Dimension	100 mm x 100 mm x 113.5 mm
Communication	UHF & VHF Frequency
Solar Panel	GaAs Triple-junction (3 Wp)
Battery	Li-Ion 10 Ah
Power (transmission)	1 W



Surya Satellite-1 Architecture



Outline

1. Background & Mission

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How would you prospect this?

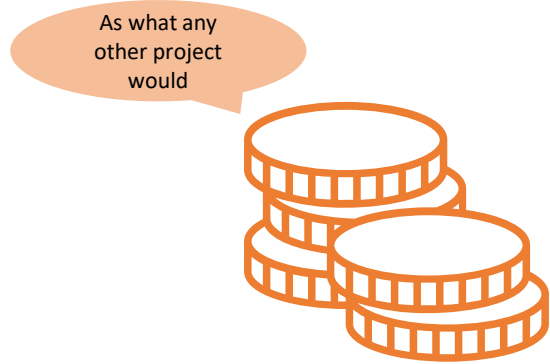


**13 Bachelor students come to you
and propose a satellite project**

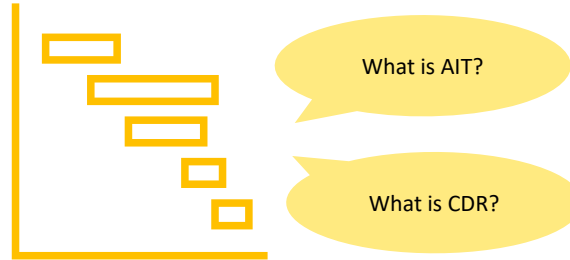
1. Physics engineering student
Undergraduate, not aerospace
2. Want to make Indonesia's first
Nanosatellite
No heritage, no experience
3. Looking for like-minded people
to help the project
Limited network
4. Request you for sponsor
We need funding

**This is SS-1 at the
beginning**

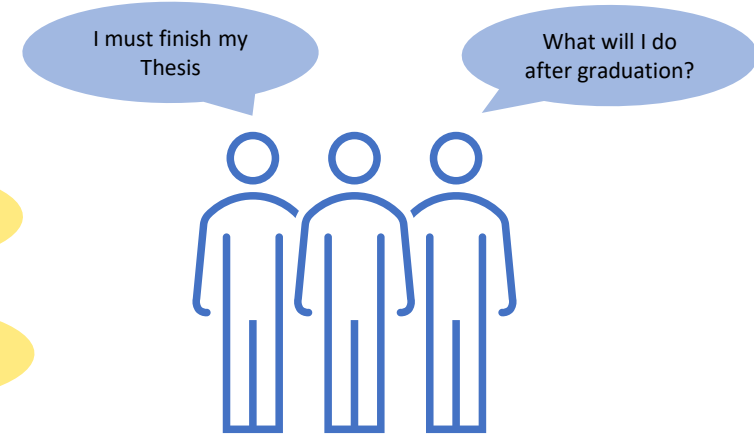
Challenges Throughout the Project



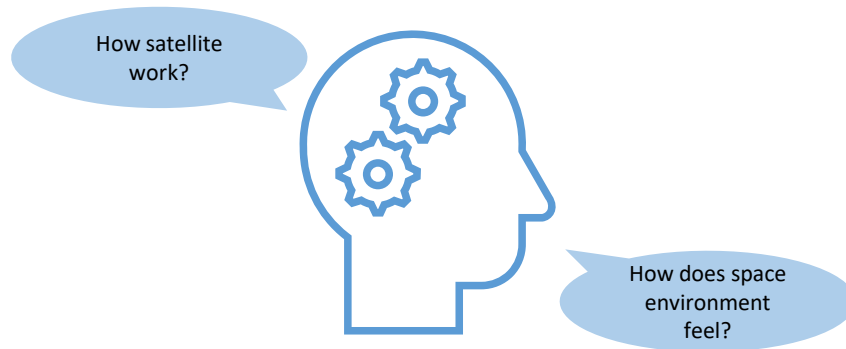
Very limited budget



Unstructured Project



Limited manpower
with mixed priority



Not Aerospace
Engineers



Limited Network

Outline

1. Background & Mission

2. Challenge

3. Major Milestone

4. Result & Conclusion



SS-1 MAJOR MILESTONE

2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023



ORARI Ground Station Workshop, Tangerang



Pusteksat BRIN, Bogor



Mock-up Model



APRSAF 2016, Manila



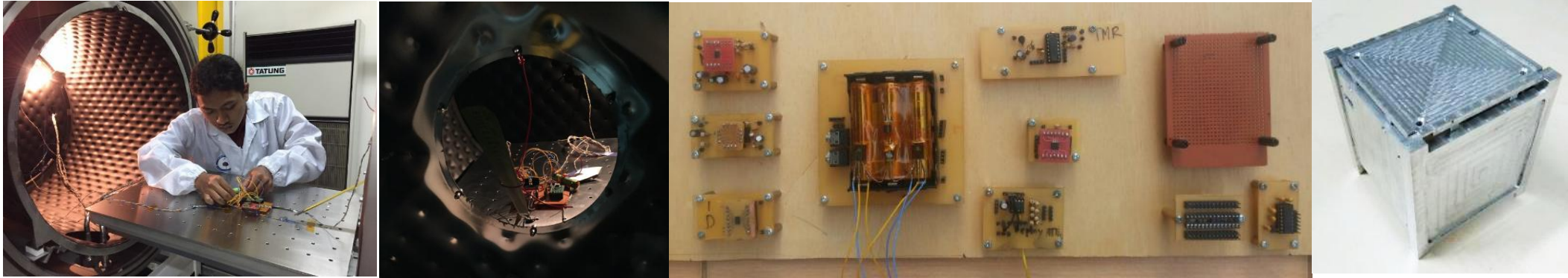
Kemkominfo, Jakarta

- Project Start & Ground Station Workshop with ORARI
- Visit to BRIN – Pusteksat (Centre for Satellite Technology)
- Completion of Mock-Up Model
- Presentation at APRSAF 2016, Manila
- Audience with the Minister of Communication and Information - Indonesia



SS-1 MAJOR MILESTONE

2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023



Satellite Sub-System Development, BRIN-Pusteksat



MOU with PT.PSN

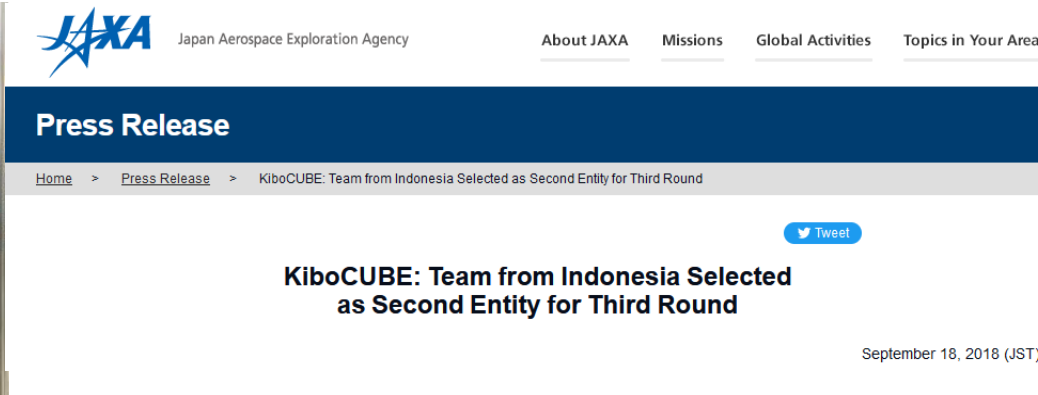


LISAT 2017, Bogor

- Structure Design and Simulation
- Development of Satellite Sub-System at BRIN-Pusteksat
- Manufacturing of Pre-engineering Model
- MoU with PT. Pasifik Satelit Nusantara
- Presentation at LISAT 2017 Conference, Bogor

SS-1 MAJOR MILESTONE

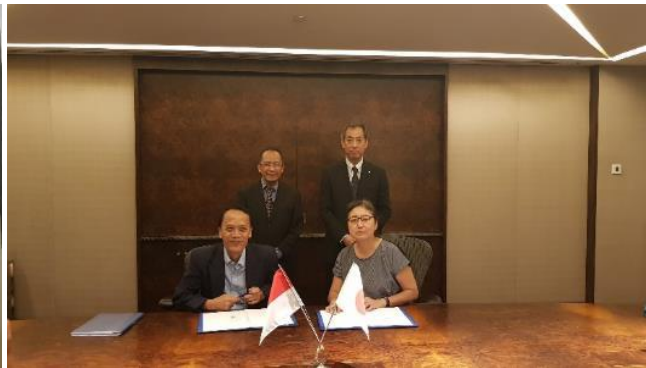
2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023



KiboCube Award at IAC 2018, Bremen



MoU with BRIN



APRSAF 2018, Singapura

- MoU with BRIN – Pusteksat (Centre of Satellite Technology)
- Start Coordination for Satellite Frequency Filing (Published API-A)
- Administration for KiboCube Competition
- Announced as the winner of KiboCube in August
- Slot for Satellite Launch award at IAC 2018, Bremen
- Signing of MoU with JAXA at APRSAF 2018, Singapore

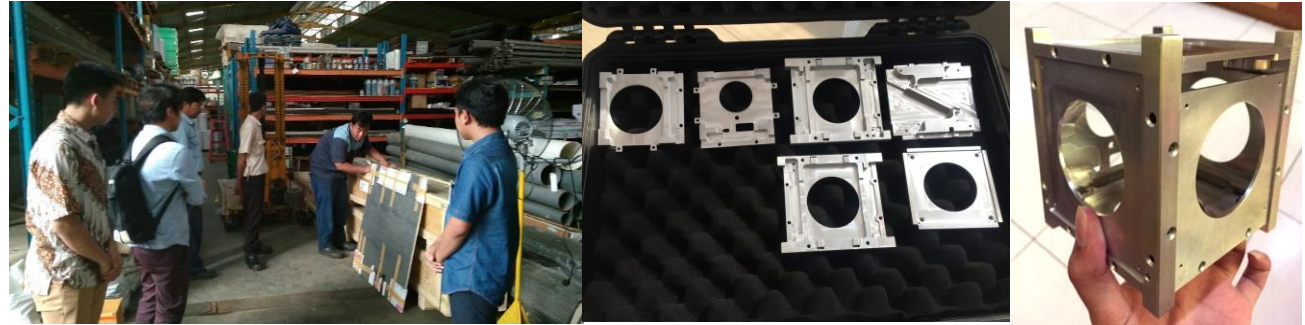


SS-1 MAJOR MILESTONE

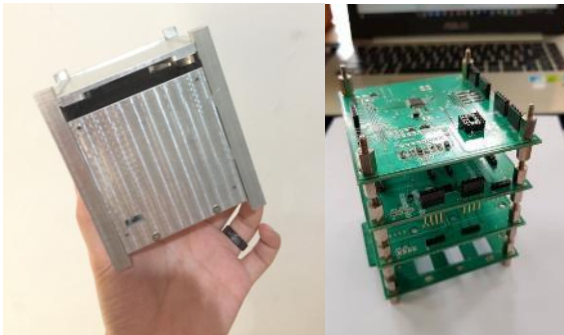
2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023



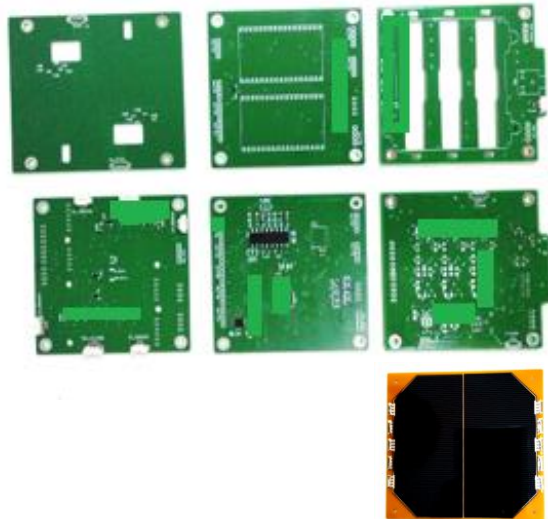
Meeting with JAXA



PUDAK Scientific, Bandung



Engineering Model



2019

- Technical Meeting with JAXA regarding launch documents
- Engineering Model/Flight Model PCB Procurement
- Handover Solar Panel from PSN
- Engineering Model/Flight Model Structure Manufacturing

2020

- Completion of Phase 012 Launch Documents
- Initiation of Satellite Assembly



SS-1 MAJOR MILESTONE

2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023



Pusteksat BRIN, Bogor

- Preparation for phase 3 launch document
- Flight Model Satellite Assembly
- SS-1 Flight Model Finished Assembly, Integration, and Testing
- SS-1 Flight Model Finished Environment Testing

SS-1 MAJOR MILESTONE

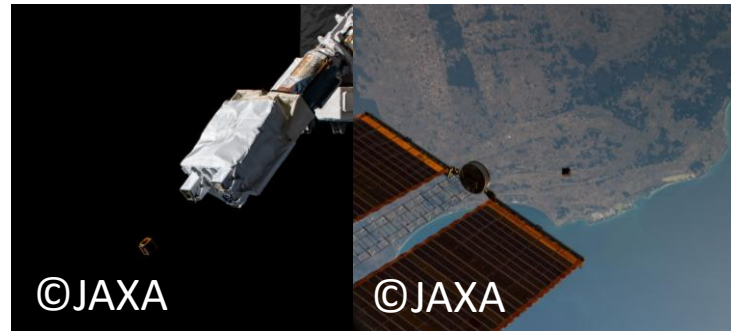
2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023



Tsukuba Space Centre, Japan



SpaceX CRS-26



SS-1 Deployment from ISS



SS-1 Ground Station

2022

- Surya Satellite-1 Finalization
- Satellite shipment to Japan
- Surya Satellite-1 Handover to JAXA
- Surya Satellite-1 Launch (SpaceX CRS-26)

2023

- Surya Satellite-1 Deployment from ISS
- Surya Satellite-1 End of Life



SS-1 Deployment

- Deployment Event successfully held on 6 Jan 2023



©JAXA



Ground Station Operation



Satellite Tracking

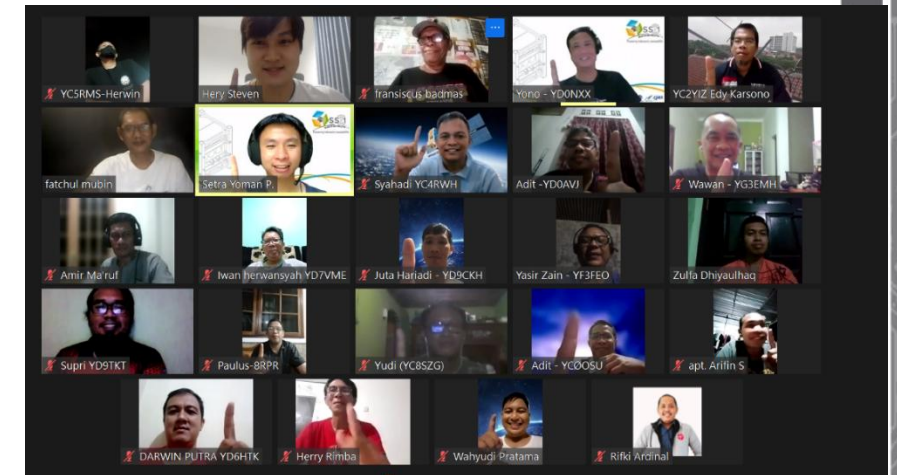


AMSAT-ID visit



EOP Preparation

- To ensure SS-1 first signal acquisition a network ground station established
- Total **33 ground stations** participate in first signal acquisition activity



SS-1 & AMSAT-ID EOP Preparation

	Event	Date
L-21	GS Hardware / Software Readiness Check	16 Dec 2022
L-14	Ground Station Operation Readiness Check	23 Dec 2022
L-3	EOP final briefing	3 Jan 2023
L-0	Deployment from ISS	6 Jan 2023



SS-1 Operation

Location in which SS-1 beacon & telemetry are received and recorded



Outline

1. Background & Mission

2. Major Milestone

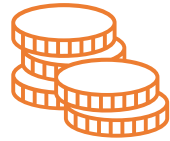
3. Challenge

4. Result & Conclusion

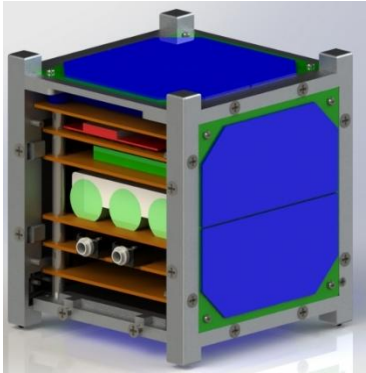


START FROM COMPONENT

EVOLUTION OF SS-1 MODEL



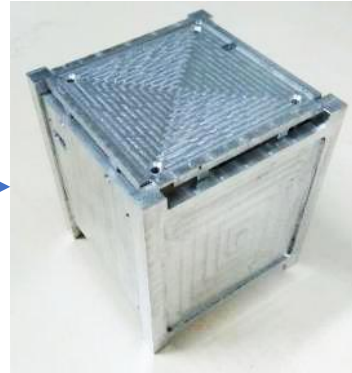
- SS-1 was built from component level
- SS-1 development are result of many in-house experiment
- Materials are sourced from Indonesia as much as possible



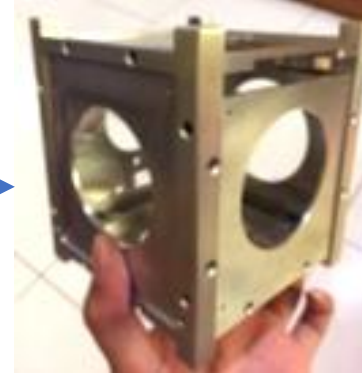
Digital Modelling



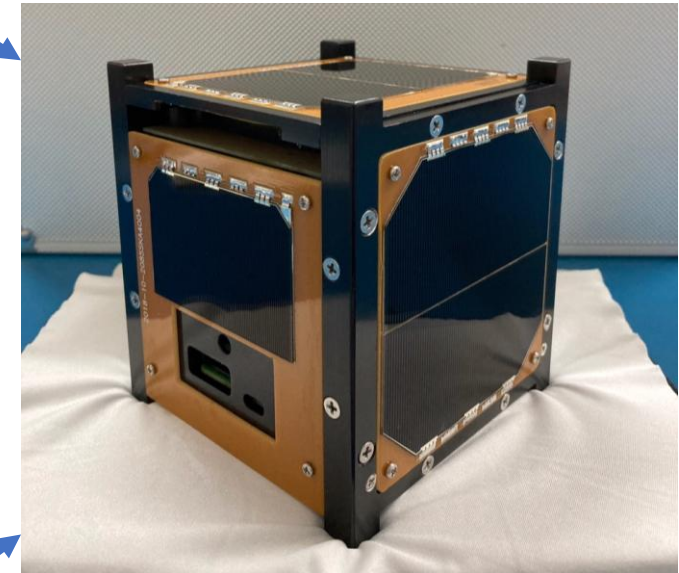
Mock-up Model



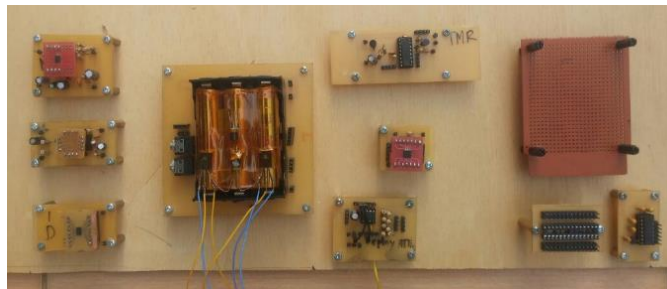
Pre-Engineering Model



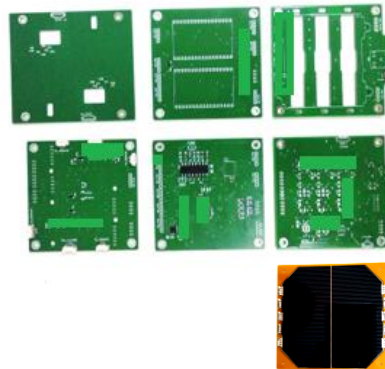
Structure Engineering Model



Flight Model



Breadboard Model



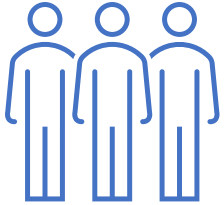
PCB Model



Electrical Engineering Model



Lesson Learned



Manpower *6 members of SS-1 lasted until the end of the project*

- Have a committed team from the start until the end of the project
- Team need to be resilience and passionate in satellite development



Network

- Find expert that can help with your project, and learn from their experience



Knowledge

- Do a lot of problem solving, brainstorming, and consulting. The solution is out there
- Expect to fail multiple times for each experiment



Project

- Focus on things that you can control
- Do what is feasible and essential with the resource that you have

Result and Outreach

Exposure and Media Engagement



Launch and Deployment Event from mainstream media

- >1,000,000 views
- >2300 comments

5 Publications:

- Development of Nanosatellite Technology with APRS Module for Disaster Mitigation – May 2018
- Requirements and design structure for Surya Satellite-1 – May 2018
- Design and Implementation of Effective Electrical Power System for Surya Satellite-1 – May 2018
- Design Structure, Dynamic Simulation, and Thermal Simulation of Surya Satellite-1 – April 2019
- The Development of Surya Satellite-1: Pioneering Indonesia Nanosatellite – soon to be released

17 Capacity Building Activities

Workshops, Seminars, Webinar, Podcast, Site Visit

SS-1 Impacts in Indonesia

SS-1 Stakeholders: enabling Indonesia collaboration in Space

Academic: Team Members



Private Industry: Manufacturing & Operations



Government: Development, Testing, Regulatory



Organizations: Spectrum License, Users



SS-1 Team Members: New Young Space Professionals

Afiq H Sulistya

MASTA Beihang University - China
LPDP Scholarship Awardee

Setra Yoman P

MSE, TU Berlin - Germany
LPDP Scholarship Awardee

Hery Steven

ME, Kyushu Institute of Technology - Japan
PNST Scholarship Awardee

Suhandinata

MSAE, Georgia Institute of Technology - USA
Fulbright Scholarship Awardee

Roberto Gunawan

Smartcard Technology Specialist, IDEMIA - Indonesia

Muhammad Zulfa D

Satellite Application Engineer, PSN - Indonesia

Nano-Satellite Projects after SS-1:

Academics:

- Indonesia Defense University (UNHAN)
- Telkom University
- Universitas Gadjah Mada (UGM)

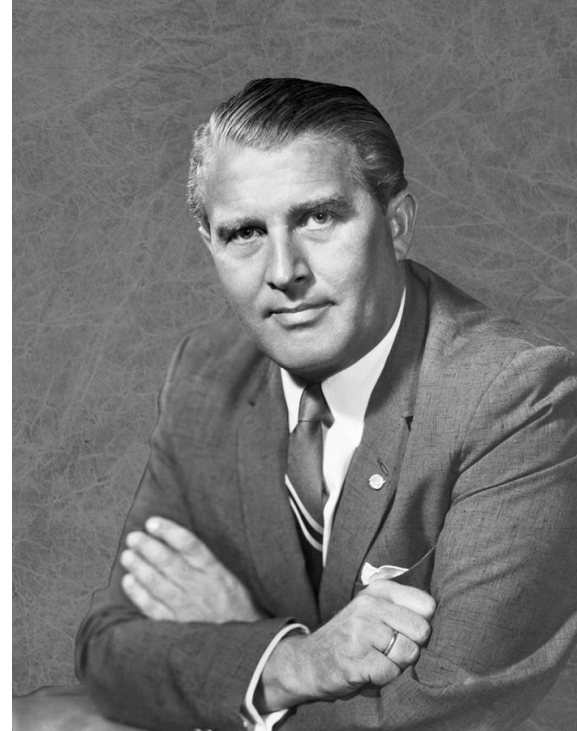
Private Enterprise:

- PT Pasifik Satelit Nusantara (PSN)
- PT Netra Teknologi Nusantara

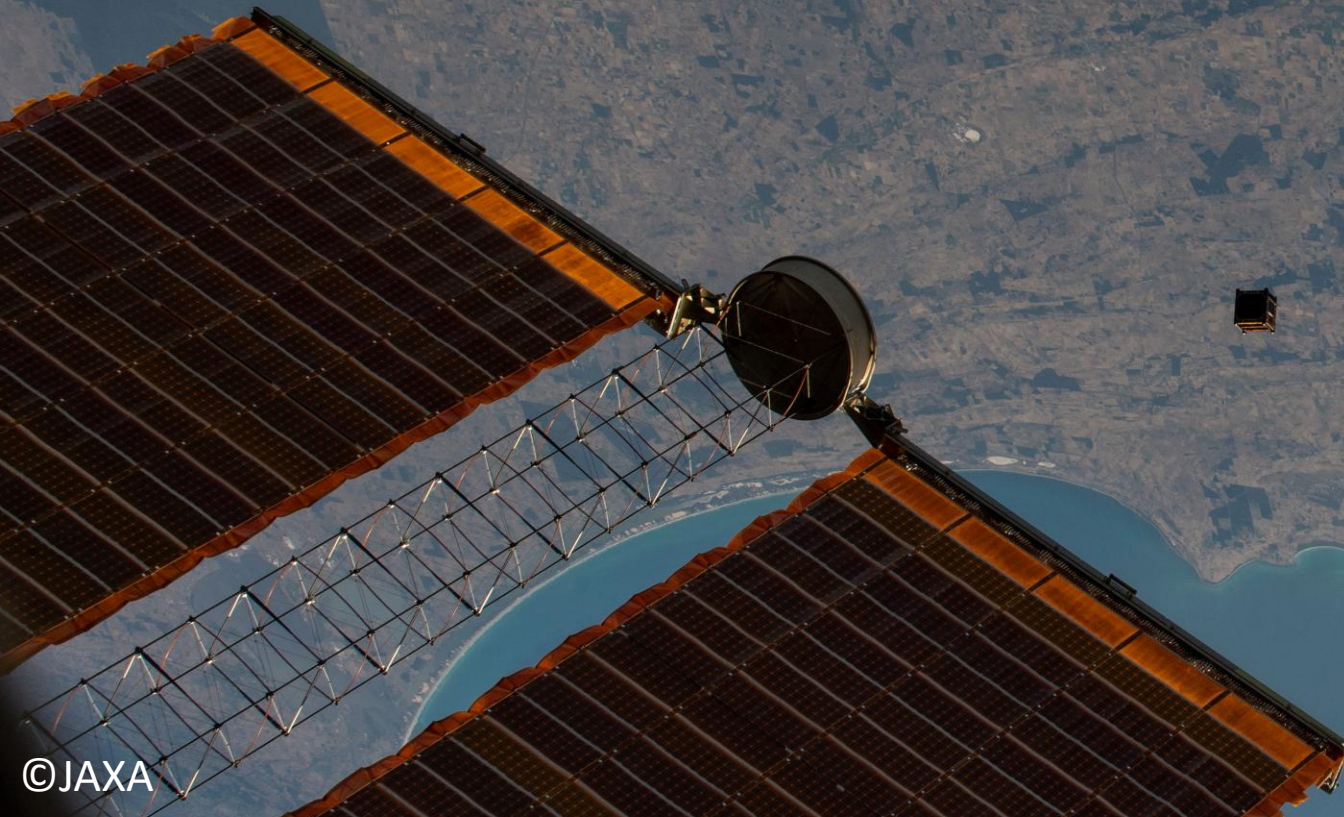
There is an old saying in Aerospace

‘One good test is worth a
Thousand Expert Opinions.’

~ Wernher von Braun



THANK YOU



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suhandinata.suhan@gmail.com

