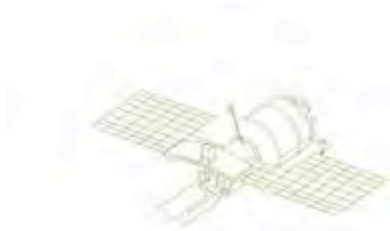
Presentation on

Singapore Space & Technology Association (SSTA) Kibo Utilisation initiatives

SCOPE

- SSTA Overview
- Singapore satellite development journey
- Ssta Kibo utilisation theme
- Ssta Kibo utilisation framework
- Implementation approach
- Requests
- conclusions



Singapore Space and Technology Association

- A non-profit association, focused on developing Singapore's space and related high technology industries
- Serves as a neutral platform to facilitate information and communication for industry, government and academia
- Spearheads initiatives that advances Singapore's space ecosystem
- Drives educational and outreach programs to encourage careers in space and high-technology engineering fields

SSTA's Advisory Board

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Former Chief Defence Scientist, MINDEF

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SPACE / SATELLITE ECOSYSTEM IN SINGAPORE & SUPPORTING INDUSTRIES

Government Agencies

EDB singapore

Office of Satellite Technology & Industry (OSTIn)

Science Centre

National Research Foundation

Research, Innovation and Technology Administration (RITA) System

DSTA Defence Science & Technology Agency

DSO National Laboratories

Satellite Manufacturer

ST Electronics (Satcom & Sensor Systems)

A company of ST Electronics

Satellite Systems

A company of ST Electronics

SSTA Singapore Space and Technology Association

Satellite Operators / Service Providers

SingTel

GeoEye

INTELSAT

SES New Skies

inmarsat

iridium

Thuraya

GlobeCast

Airbus Defence & Space

arianespace service & solutions

Amplus Communication

THALES

addvalue technologies

NERA

Academic and R&D

Agency for Science, Technology and Research

CRISP National University of Singapore

NUS National University of Singapore

Nanyang Technological University

Polytechnics & MOE Schools

Corporate Members

SSTA is Singapore's lead space industry development association

SSTA
Singapore Space and Technology Association

Singapore satellite development journey

R&D & Technology Developmental Phase
Mid-90s to 2011

Commercialisation Phase
2011 – 2015

Sub System

- NTU
  - Merlion S & L Bands Comms Payload
  - Surrey's UoSat-12
  - 21/4/1999

Experimental Satellite

- CREST-NTU
  - XSAT Microsat
  - 20/4/2011
  - Still in service

Singapore Satellite Industry

- ST SatcomS
  - May 2011 formed JV SatSys Pte Ltd
  - ST+NTU+DSO
  - TeLEOS-1
  - End-2015

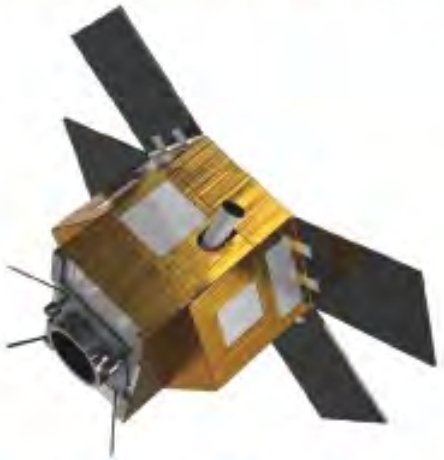
Successful launch of Singapore's 6 satellites – 16 Dec 2015

Lift-off Time: 2030 Hrs (SG Time)

TELEOS -1

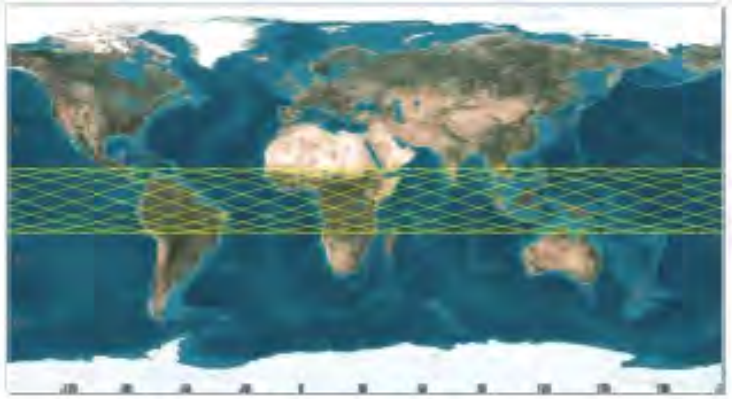
- Technical Specifications
  - Design Life: 5 years
  - Orbit: Near Equatorial Orbit (15° Inclination)
  - Orbital height: 550km
  - Orbital Period: 96min
  - Mass: 400kg (Minisatellite)
  - Imagery Downlink: 300 Mbps

Launched 16 Dec 2015

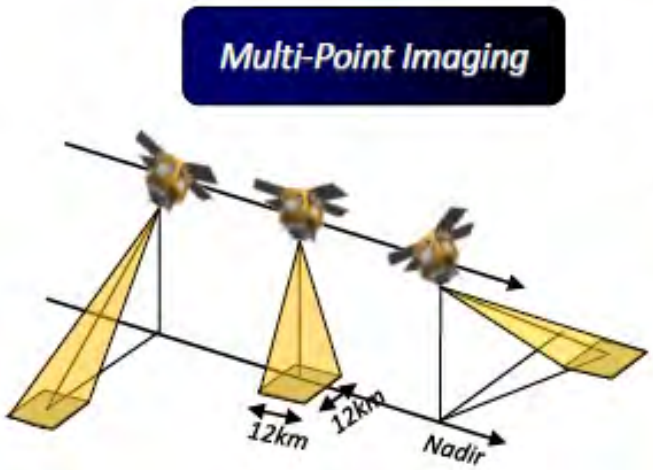


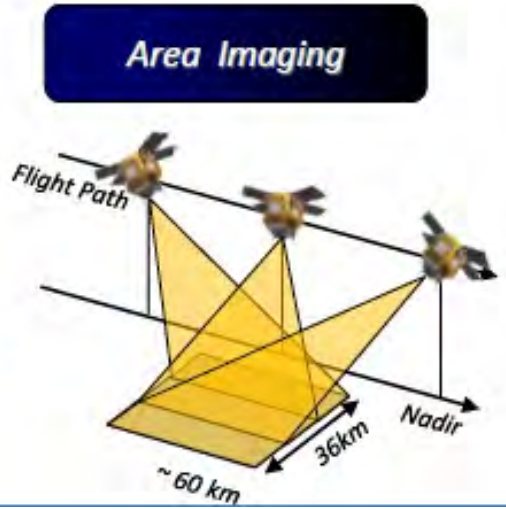
TeLEOS-1 SS-400 Bus

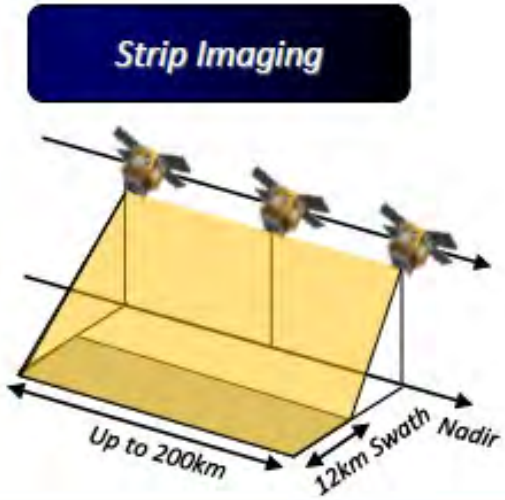
TELEOS -1



- Imaging Specifications
  - Mean Revisit Time: 12 to 16 hours
  - Availability: 6 daylight imaging passes daily (Comms Zone)
  - Camera: 1m Panchromatic (at nadir)
  - Swath width: 12 km

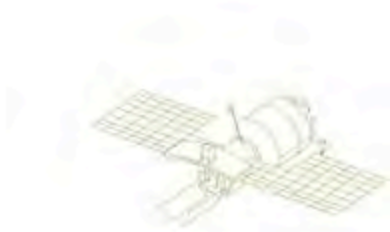






SSTA KIBO UTILISATION INITIATIVES

SPACE ENVIRONMENT FOR EDUCATION AND TECHNOLOGY DEVELOPMENT



SSTA Kibo Utilisation Framework

Initiatives-Projects Matrix	Pressurised-Xperiment	JSSOD	ExHAM
Education	Observable Physics & Math Theories	Cube & Micro-Sat System Engineering	-
R&D	Micro-G Bio & Chemical Experiment	Satellite technology & new application demonstration projects	New space grade material & electronics trials
Commercial Product	Micro-G Bio & Chemical Trials	Cube & Microsat	-

SSTA Kibo Utilisation Framework

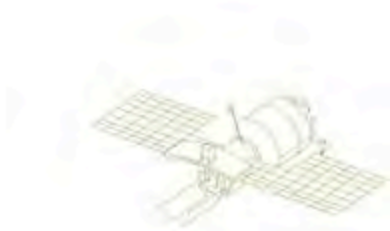
Initiatives-Kibo Utilisation Matrix	Pressurised-Xperiment	JSSOD	ExHAM
Education	Schools, Polytechnics & Universities	Polytechnics & Universities	
R&D	Polytechnics, Research Institutions & Universities	Research Institutions & Universities	
Commercial Product	Industry, Research Institutions & Universities		

SSTA Kibo Utilisation Framework

Initiatives-Organisations Matrix	Schools	Polytechnics	Universities	R&D	Industries
Education	Local Public/ Private & International Schools	5 x Polytechnics	- NTU - NUS - SUTD - SIT	-	-
R&D	-			- A*Star Research Institutions - DSO - Temasek Labs - NTU-Thales Lab	- ST Electronics - ST Dynamics
Commercial Product	-	-			

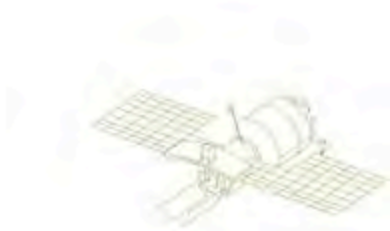
SSTA Kibo Utilisation Implementation Approach

- Two Ps Approach
  - Promote the Kibo Utilisation
  - Provide Kibo Utilisation One-Stop Service



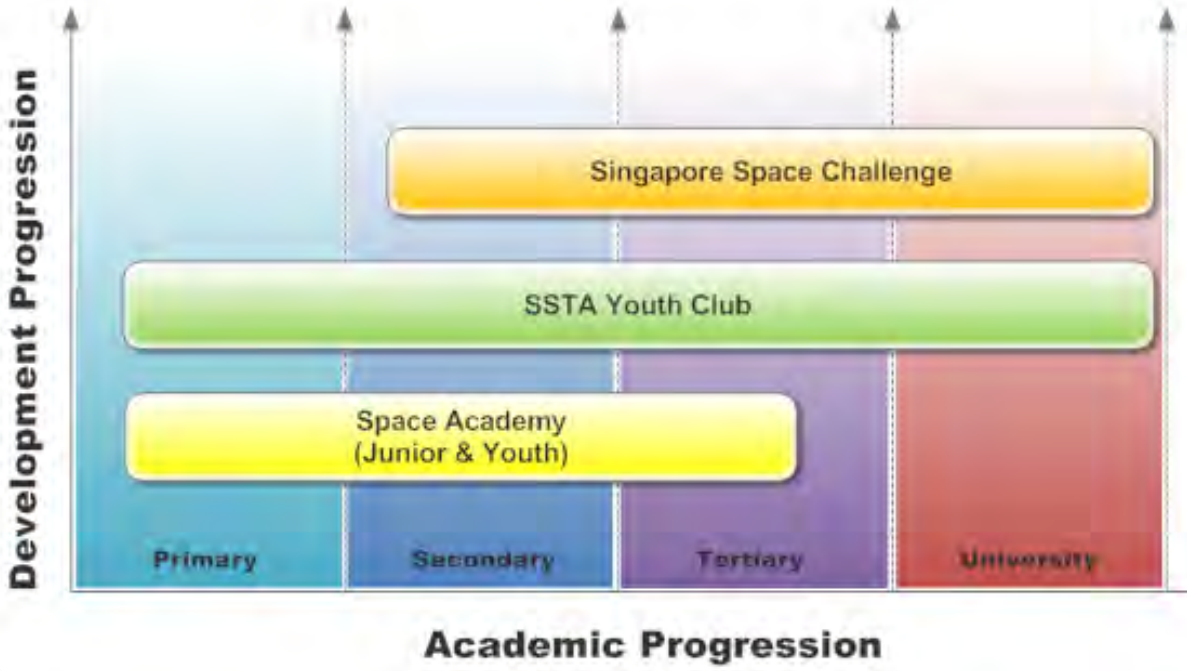
SSTA Kibo Utilisation Implementation Approach - Promote

- Promote the Kibo Utilisation to SSTA academic & corporate members
  - via email
  - During SSTA members' events
- Promote the Kibo Utilisation at SSTA website



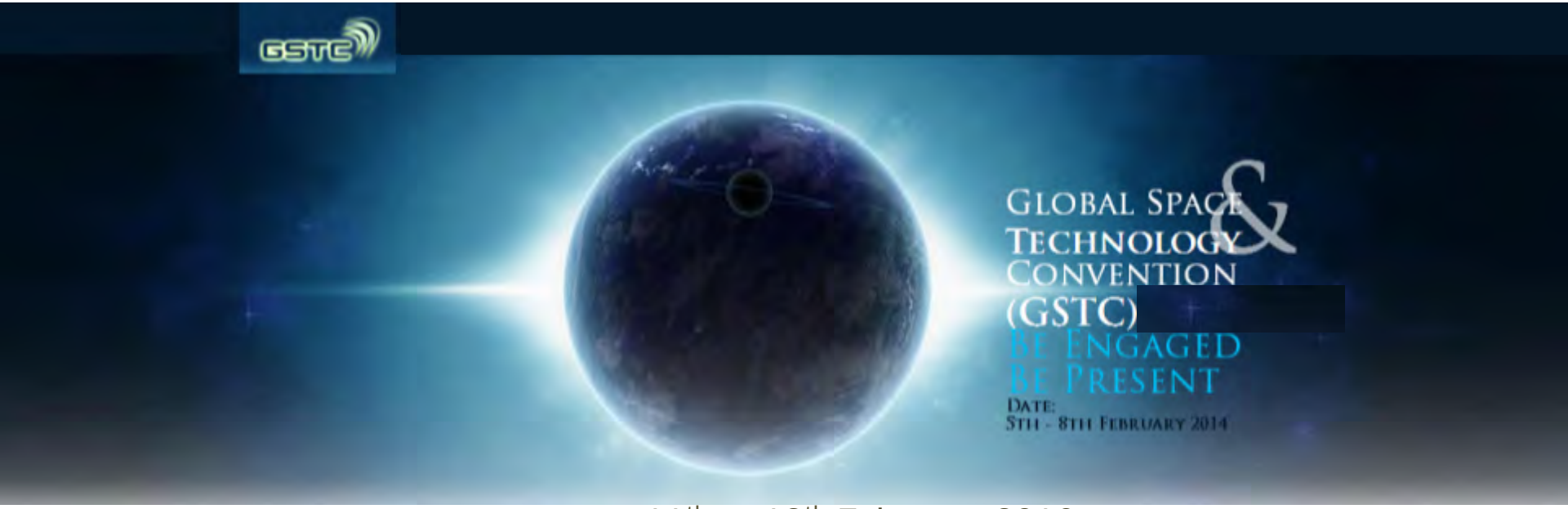
SSTA Kibo Utilisation Implementation Approach - Promote

- Include appropriate Kibo utilisation program in SSTA education programs
  - Space Academy Singapore (SAS) for Junior & Youth
  - Singapore Space Challenge (SSC)



SSTA Kibo Utilisation Implementation Approach - Promote

- Announce & Profile Kibo utilisation projects at SSTA organised annual space convention
  - Global Space Technology Convention (GSTC)



Recent GSTC: 11th to 12th February 2016

Next GSTC: February 2017 (Also SSTA 10th Anniversary)

Guest of Honour: Mr. S. Iswaran, Minister for Trade & Industry (Industry)

PREVIOUS GSTC MOMENTS @ THE CONFERENCE





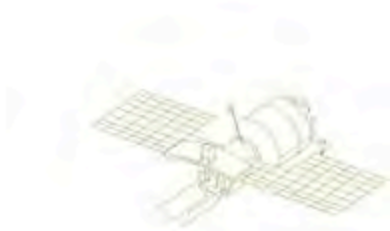




SSTA Kibo Utilisation Implementation Approach - Promote

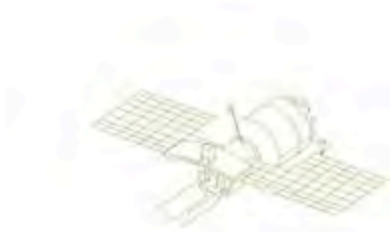
- Introduce Kibo utilisation to other local programme
  - Young Defence Scientists Programme (YDSP)
  - Defence Innovation Research Programme (DIRP)
  - Seed Research Programme
  - National Research Foundation Competitive Research Programme (CRP)

- Introduce Kibo utilisation to industries
  - Create awareness via workshops & seminars
  - Brief on process, project schedule, ICD, submission/application & fees



SSTA Kibo Utilisation Implementation Approach - Provide

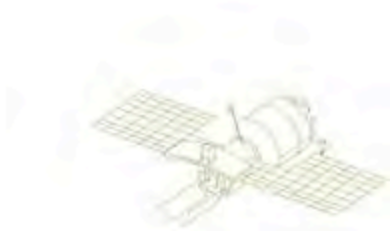
- SSTA to offer One-stop service for all Kibo utilisation initiatives & projects
  - Announcement & Update (Process, Project Schedule, ICD, Fees, etc)
  - Manage submissions & shortlisting
    - Education, Pressurised X-eriment, JSSOD & ExHAM
  - Coordinate interactions between project sponsor & Kibo-ABC Office & Jaxa
  - Provide professional consultancy or advice to project team
  - Provide project management services



SSTA Kibo Utilisation Follow-Up

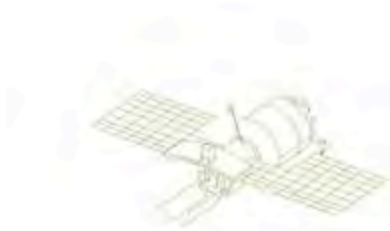
- SSTA continues to manage Try-0-G experiment
  - Announcement of selected project
  - Award of certificate of participation (to all participating team members)
  - Organising visit by finalist team to Jaxa ground station in Tokyo to witness experiment live-broadcast
  - Request online live-feed to local schools (those who cannot visit)
    - Recording if live-feed not available

- Once ICD & Details of JSSOD & ExHAM are available
  - Prepare and disseminate marketing and promotion materials
  - Plan for workshop/seminar



SSTA Kibo Utilisation - Request

- Try-0-G submission to be in end-Mar
  - December is school vacation
  - End-Feb submission is too short (esp for Cat 2)
- Try-0-G parabolic flight for Singapore students
  - Kick-start the Kibo utilisation momentum
  - Good awareness and promotion for better Kibo utilisation by academic and industry



Conclusions

- Singapore space development journey has just entered the industrialisation/commercialisation stage
- There is a national need to educate and train students for the local satellite R&D & industries
- SSTA-JAXA partnership under the Kibo-ABC working group is timely & mutually beneficial
  - Create awareness and interest in satellite technology & industry
  - Attract more students to science, technology, engineering & math (STEM)
  - Provide an affordable space environment for R&D, product development & launching of cube/microsat
- To ensure this SSTA-JAXA partnership has good outcome for both parties, important to have series of Kibo utilisation participations to get the momentum going

Terima Kasih

&

Thank You

SSTA
Singapore Space and Technology Association