UNISEC-Global Challenge - for Sustainable University Space Activities

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UNISEC-Global

Vienna, Austria, June 19, 2019.
United Nation Committee on the Peaceful Uses of Outer Space (UNCOPUOS)

Outline

- UNISEC-Global “VISION 2030-ALL”
- UNISEC-Global Approach
- CanSat Activities
  - CLTP
  - ARLISS
  - New educational tools –HEPTA-Sat
- Eco-system model for University Space Project/program
- Conclusion
- Upcoming Events in 2019

Vision 2030-ALL

*"By the end of 20**30**, let's create a world where university students can participate in practical space projects in **all** countries."*

Key principle of the 2030 Agenda for Sustainable Development :

No one will be left behind.

17 Local Chapters, 50 Points of Contact

UNISEC GLOBAL
University Space Engineering Consortium

UNISEC-Global's Approach

Training Program

HEPTA-Sat Training

CanSat Leader Training Program

Forum, Conferences, Technical competitions

UNISEC-Global Meeting, Mission Idea Contest, Nano-satellite Symposium, CanSat Competition

Vision 2030-ALL

Debris Awareness and Solutions

Debris Mitigation Competition

IAA Study Report: A Handbook for Post-Mission Disposal of Satellites less than 100kg

Support Global Space Projects initiated by member universities

CanSat Leader Training Program (CLTP)

Objective: CLTP is a training program for professors/instructors to learn how to conduct CanSat (or HEEPTA-Sat) training by experience. Participants are expected to teach their students after training. It has contributed to capacity building in basic space engineering and technology.

Launched: October 2010 (1st CLTP was held in 2011)

Offered: Annually

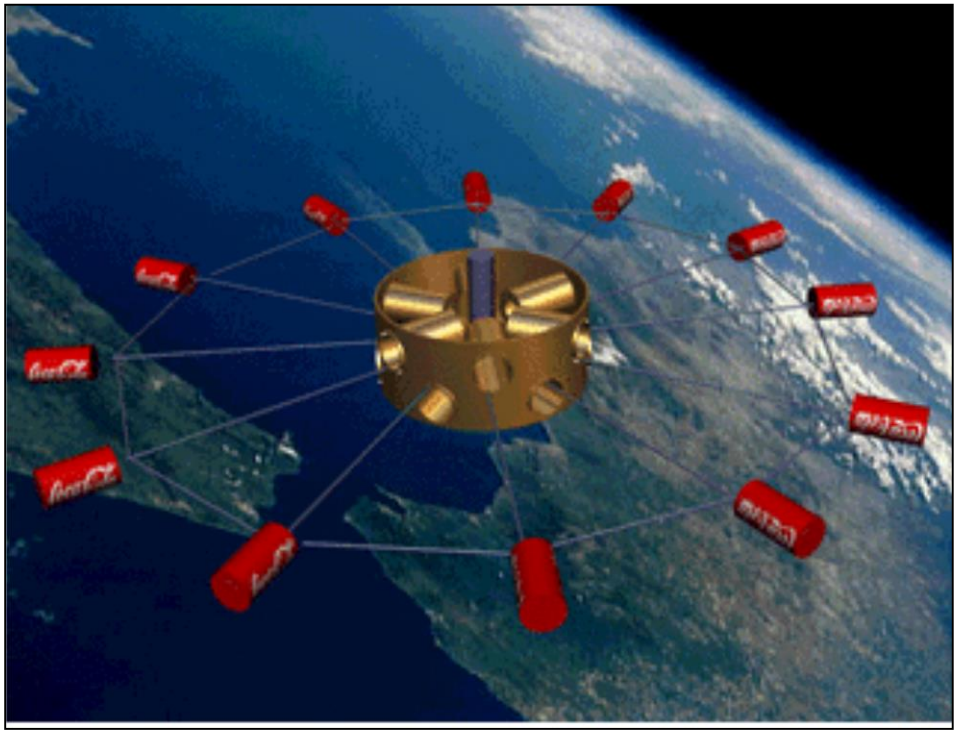
Graduated: 81 participants from 37 countries

CLTP10 will be held in August 19-30, at Nihon University, Japan

UNISEC - CanSat Training /Competition in 2019

Event	Date	Venue	Participants	
CanSat Training Program	Feb3-5	Cairo, Egypt	30	Domestic
Tanegashima Rocket Contest (incl.CanSat)	March6-9	Kagoshima, Japan	315	Domestic
Thailand CANSAT-Rocket Competition 2019	July	Thailand	200-300	Domestic
CanSat Competition in Noshiro Space Event	Aug15-17	Akita, Japan	200	Domestic
21st ARLISS	Sep9-12	Nevada, USA	200	International
CanSat Short Course	Sep23-28	Bekaa, Lebanon	96	Domestic
1st CRIC 2019	Oct 4-6	Serbia	200	International
5th national CANSAT contest (Mexico)	Oct10-11	Tijuana, B.C. Mexico	150	Domestic
CanSat workshop	Oct	Córdoba Argentina	30	Domestic
CanSat Training	Nov8-10	Istanbul, Turkey	100	Domestic

Birth of CanSat at USSS 1998



Initial Concept: launch all the CanSats and operate them in next USSS (one year later)

"Let's make a satellite out of this Coke-can !!"

Prof. Bob Twiggs, Stanford University

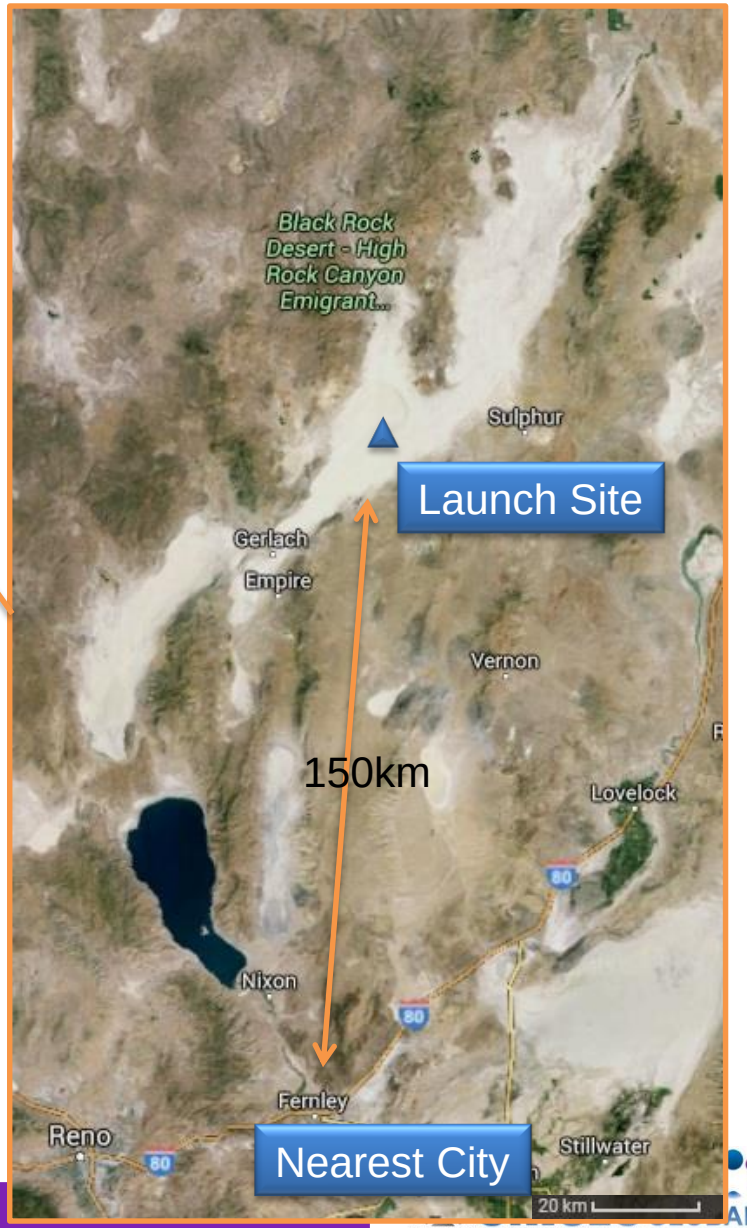
ARLISS 1999-2018

A Rocket launch for International Student Satellites

A CanSat launch event at BlackRock desert, NV, US

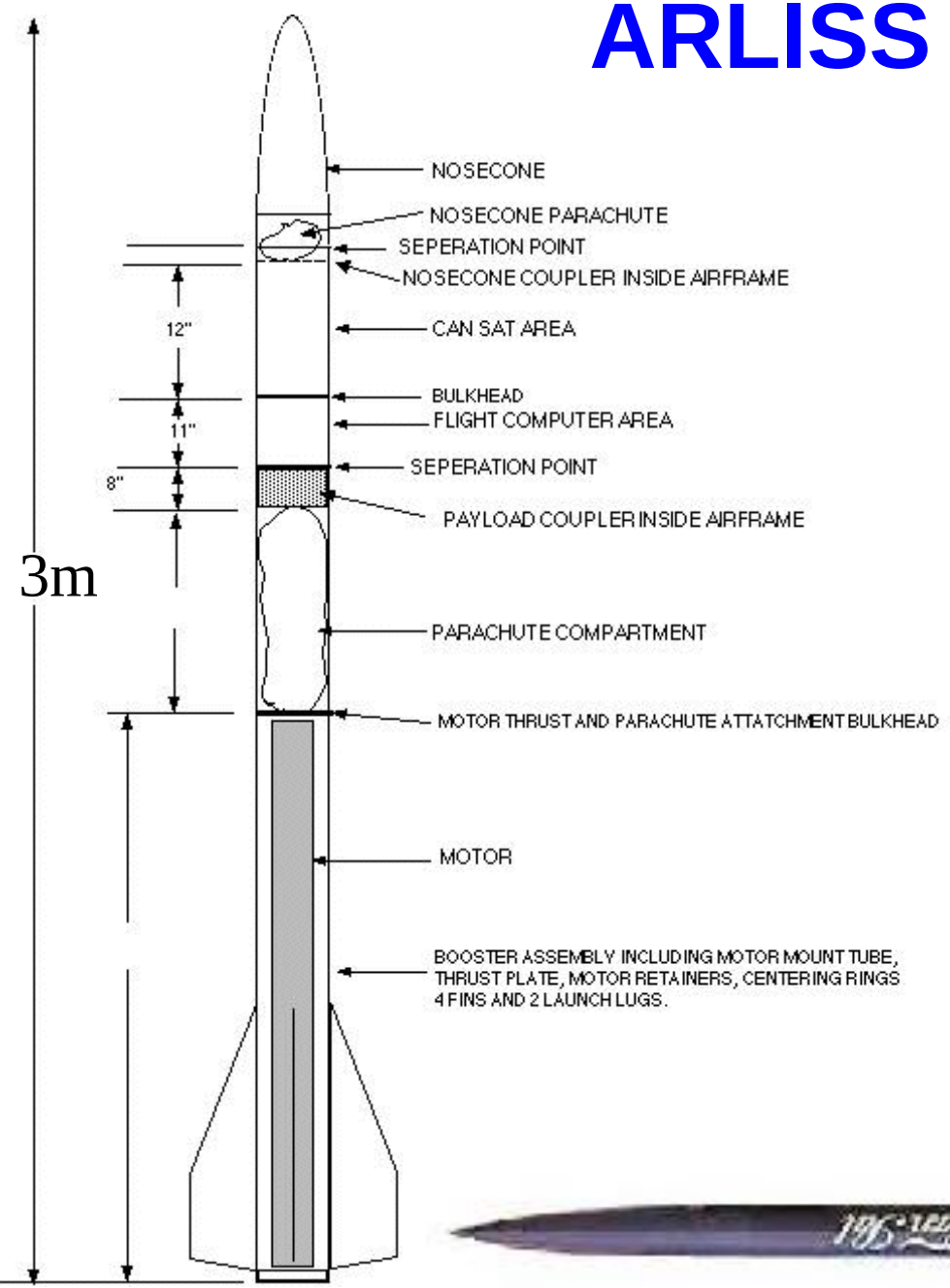
- organized by AEROPAC (An amateur rocket group in US) and UNISEC
- 1 stage solid motor to 4,000m
- Three 350ml sized cans or one large can (<H240mm, dia.140mm)
- Cost $400 /flight

Black Rock Desert



University Space Engineering Consortium

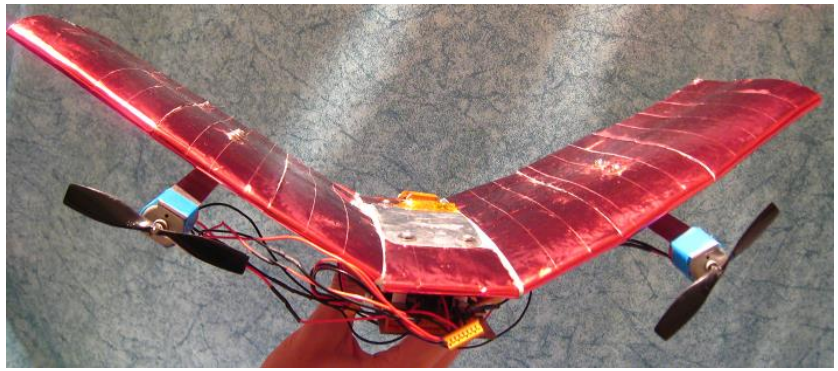
ARLISS Rocket

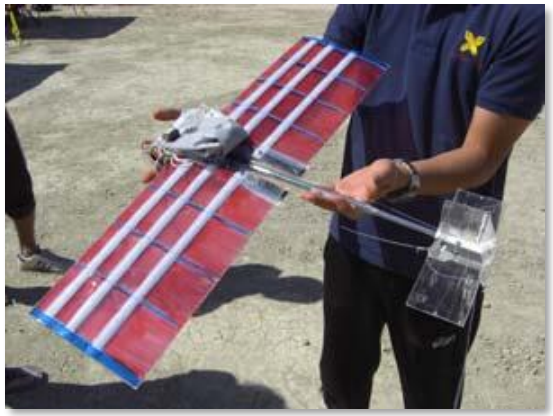


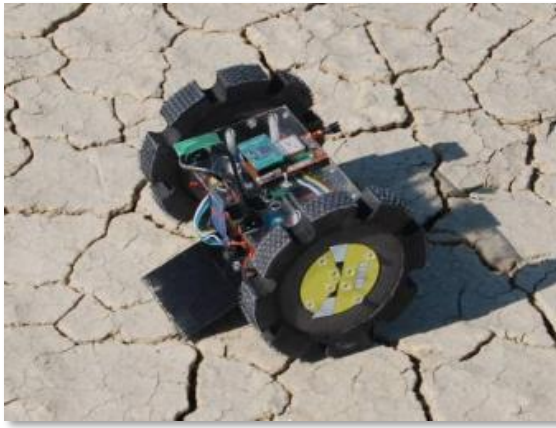
- AEROPAC Amateur Rocket group
- 1 stage solid motor
- Lift 1.8 kg to 4 km
- Three 350ml sized cans or one “Large sized can”
- Black Rock Desert (Nevada, USA)

2001～ Comeback Competition

CanSat evolution – various types







"Paraglider" type

"Plane" type

"Rover" type

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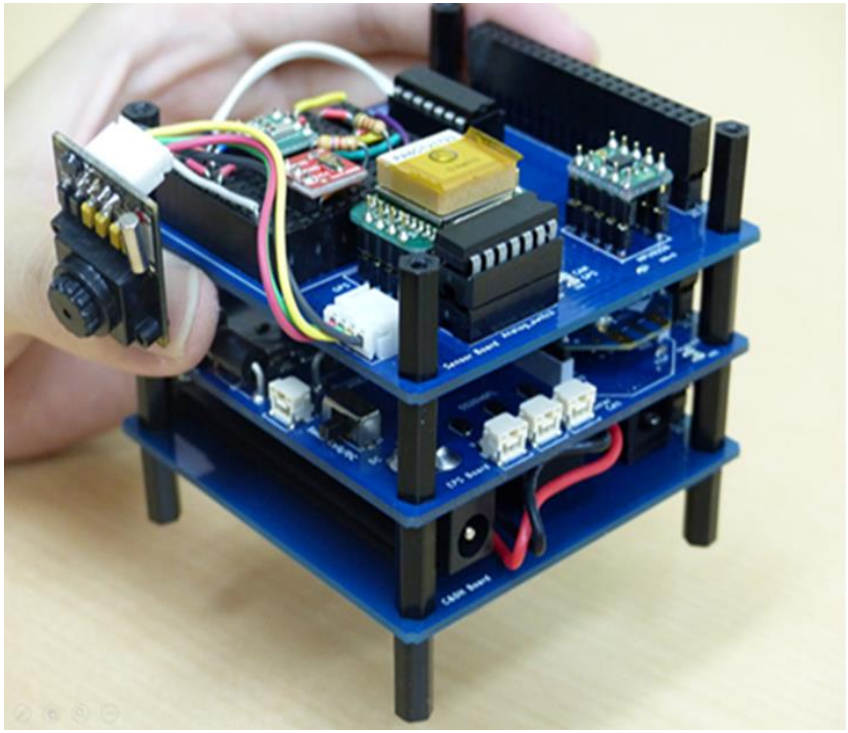
Educational Significances of CanSat/Micro/Nano/Pico-Satellite Projects

- ***Practical Training of Whole Cycle of Space Project***
  - Mission conceptualization, satellite design, fabrication, ground test, modification, launch and operation
  - Know what is important and what is not.
- ***Importance for Engineering Education***
  - Synthesis (not Analysis) of a really working system
  - Feedbacks from the real world to evaluate design, test, etc.
  - Learning from failures (while project cost is small)
- ***Education of Project Management***
  - Four Managements: "*Time, human resource, cost and risk*"
  - Team work, conflict resolution, discussion, documentation
  - International cooperation, negotiation, mutual understanding
- ***Also contributions to other technology areas !***

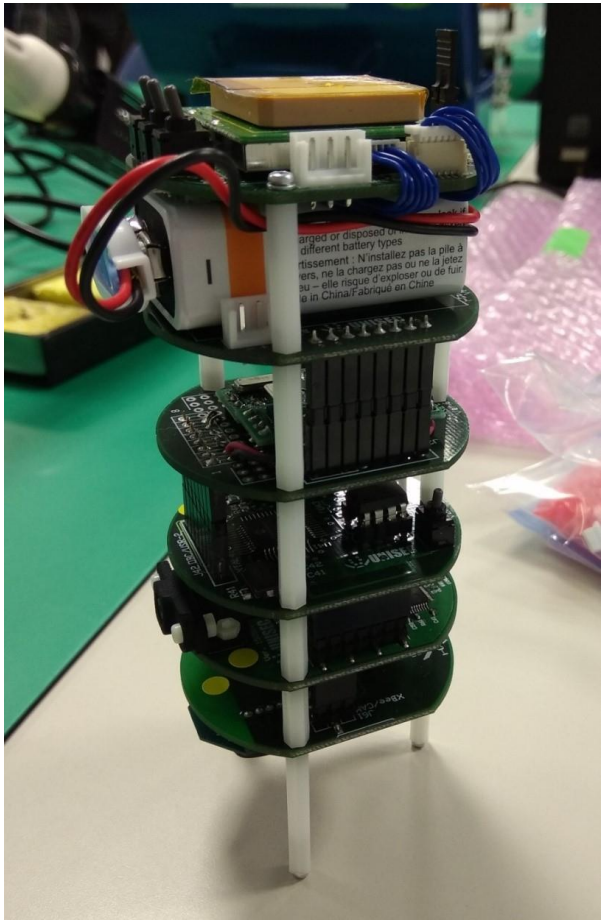
Significance of CanSat Program

- Very Short Period Required for One Whole Project
  - *5-6 months for mission conceptualization, satellite desig fabrication, ground test, modification, launch, operation*
  - *Launch date is fixed in ARLISS: no delay is allowed*
- Very Low Life Cycle Cost for One Project
  - *$500 - 1,000 budget for one team (typically)*
  - *Rocket launch requires $400/flight, etc.*
- Small, but Still Can be “a Satellite”
  - *All the satellite functions + mission can be packed*
- Can be Retrieved after Experiment
  - *Analysis of the causes of failures is easy*
- No worries of debris

Training Programs: Educational Kits



HEPTA-Sat
(CLTP8-, HEPTA-Sat Training Workshops)
Developed by: UNISEC-Japan



i-CanSat
(CLTP3-7, CTP)

New Tool: HEPTA-Sat

International Knowledge and Technology Transfer for CubeSat Development

(Hands-on Education Program for Technical Advancement)

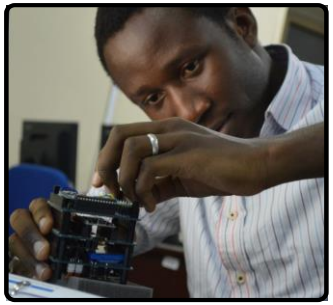
Southern Hemisphere Space Studies Program 2019
Collaboration with International Space University(ISU)

What is HEPTA-Sat Training Program？

1) Understanding basic satellite system architecture.
2) Experiencing the pico-satellite development process in a short time.
3) Acquiring the basic knowledge of space engineering.

Step 1:
Lecture

Step 2:
Hardware Assembly

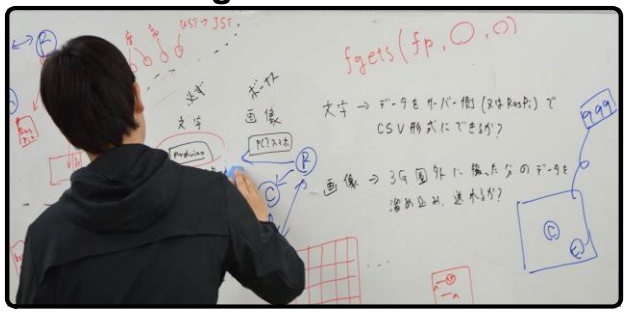


Step 5:
Field test

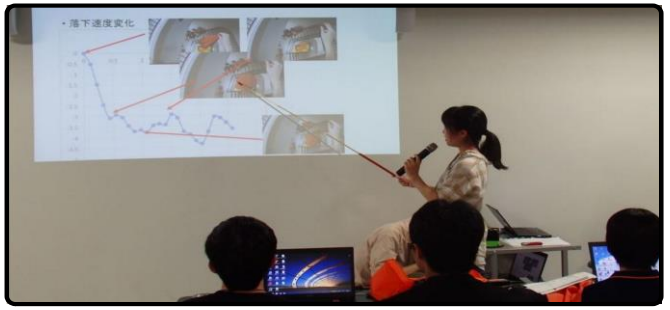
Congratulations!

Step 3:
Hardware & Software Integration

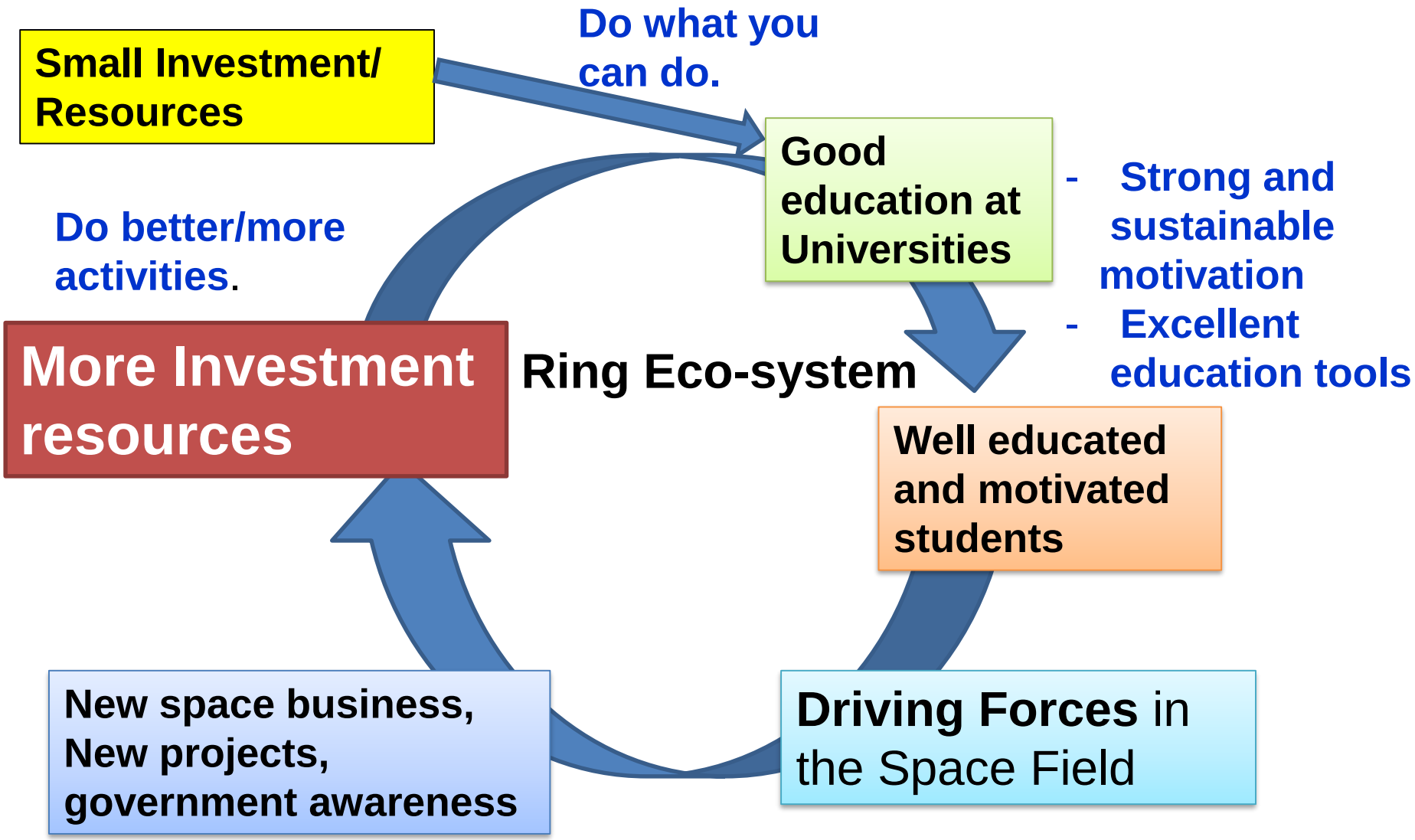
Step 4:
Mission Design



Step 6:
Review & Presentation



Eco-system Model of University Space Projects/Program



Conclusion

- UNISEC-Global aims to realize a world where university students can participate in practical space projects in all countries.
- Building an eco-system of space education would be beneficial to academy, industry and government
- Initial small investment/resources will trigger “Ring Eco-system.”
- Strong and sustainable motivation will drive this Ring Eco-system continually to grow larger and better.
- Excellent space education tools are essential to keep such strong motivation. CanSat/ARLISS and Hepta-sat organized by UNISEC-GLOBAL can make such contributions.
- Again, initial small investment is key to trigger the movement

Upcoming Events in 2019

- **10th CanSat Leader Training Program (CLTP10)**
  (August 19-30, 2019), Nihon University, Chiba, Japan.
- **21st ARLISS** (Sep 9-12), Black Rock Desert, Nevada, USA
- **7th UNISEC-Global Meeting** (Nov 30-Dec 3, 2019),
  The University of Tokyo, Tokyo, Japan
- **6th Mission Idea Contest (**Dec 2) Abstract Due : August 8
  - For Archiving Sustainable Development with Human Spaceflight

Associated Event

HEPTA-Sat Training Short Course (Dec 4-5, 2019) Tokyo

Lean Satellite Workshop (Dec 4-5, 2019) Tokyo

Global Space Job Fair in Tokyo (Dec 6, 2019) Tokyo

Thank you!

UNISEC-Global Secretariat

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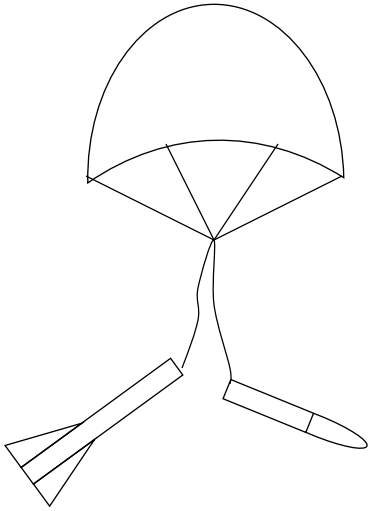
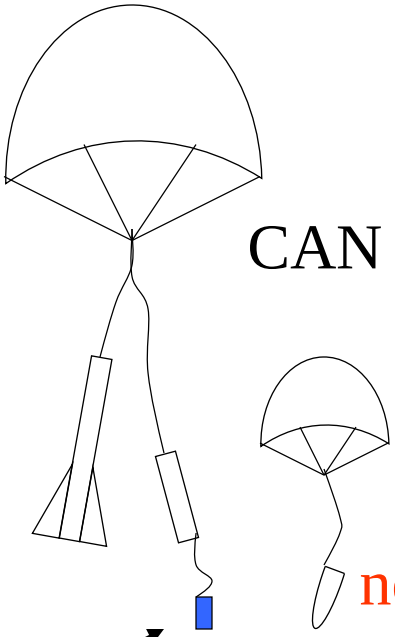
Back-up slide

ARLISS

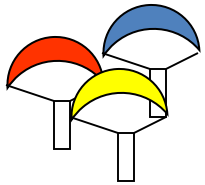




CAN SAT deployment

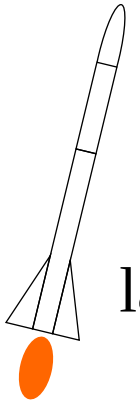
nosecone

carrier

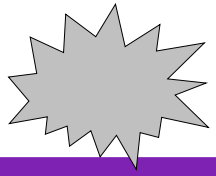


15-20 min
after release

4km altitude



launch



Amateur Rocket Launch and Descent by Parachute

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20-year practical space education

- 1998 CanSat concept at USSS (University Space Systems Symposium, 1998~2005, US-Japan conference in Hawaii)
- 1999 ARLISS (A Rocket Launch for International Student Satellites)
- 1999 CubeSat concept at USSS
- 2003 First CubeSats on orbit
- 2011 CanSat Leader Training Program
- 2015 HEPTA-Sat - New tool for satellite training
- 2018 20th Anniversary of ARLISS