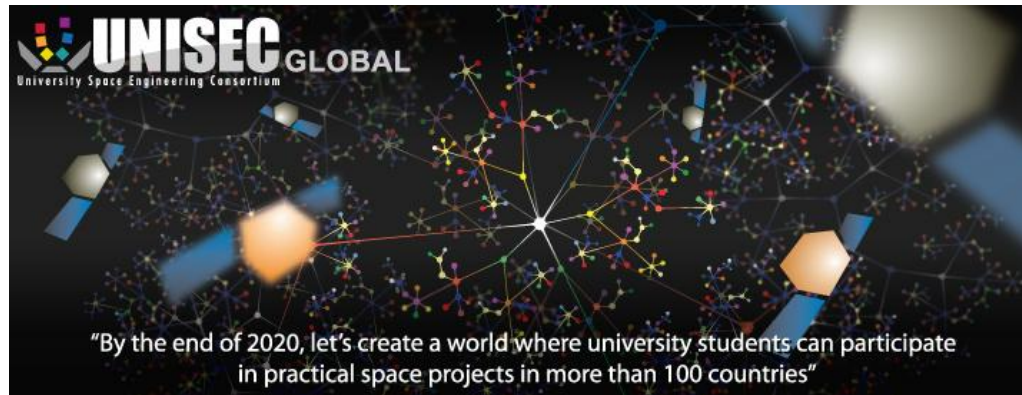


UNISEC-Global Challenge: How can we contribute to Capacity Building?



October 30, 2017, Samara, Russia
United Nations - Russian Federation Workshop on Human
Capacity-Building in Space Science and Technology for Sustainable
Social and Economic Development

Rei Kawashima, UNISEC-Global
secretariat@unisec-global.org

Outline

- Introduction to UNISEC-Global
 - Background
 - Activities
 - Training Program
 - Contests
 - Conferences/Workshops and Meetings
- Discussion
- Upcoming Event

Background – UNISEC-Japan

- **UNISEC:** “University Space Engineering Consortium”
 - UNISON: UNISEC Student Organization
 - UNISAS: UNISEC Alumni Organization
- NPO/NGO to facilitate/promote university level students’ practical space development activities, such as designing, manufacturing and launching small satellites and hybrid rockets.
- Established in 2002, obtained legal status in 2003
- 72 laboratories/groups from 50 universities
- More than 900 student members, 267 individual members, 15 corporate members (as of July, 2017)
- 3 pillars: Human resource development, Technological development, Outreach



45 university satellites launched in 15 years



From CanSat to CubeSat, Nano-Satellite

From Educational purpose to Practical application

Achievements

(human resource development)

- Provide many engineers/researchers who have
 - Proficient knowledge of satellite/rocket and their subsystem design and manufacturing
 - Systems engineering and integration
 - Project management skills
 - “Guts” to tackle challenging problems
- To space development field in Japan as well as many other technological areas such as automotive, aircraft plants, electronics, construction, etc.

Vision 2020-100

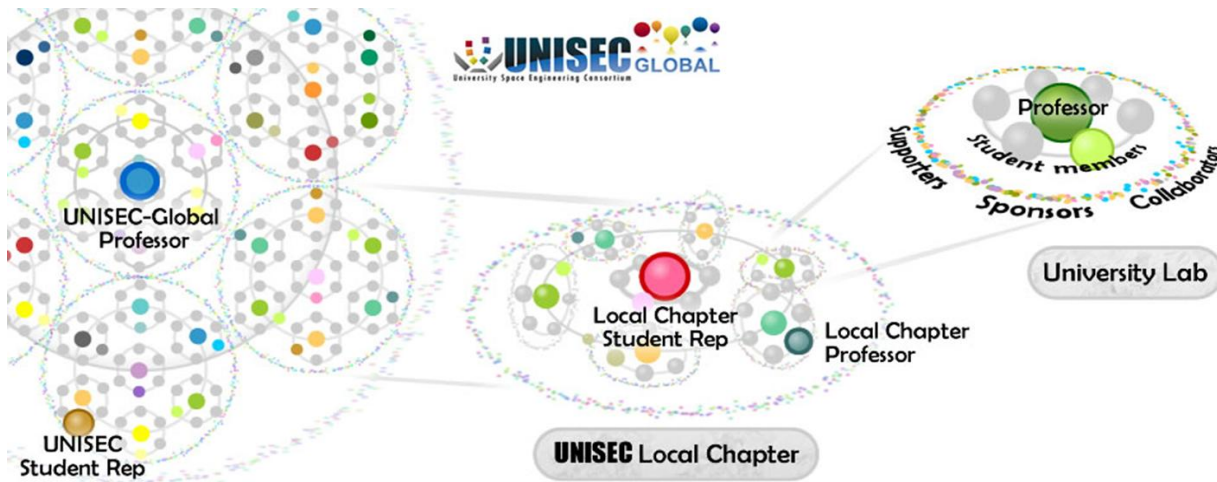
“By the end of 2020, let’s create a world where university students can participate in practical space projects in more than 100 countries.”



How to start/implement practical space engineering education can be transferred to existing universities anywhere.

What is UNISEC-Global?

- **UNISEC-Global** is an **international nonprofit, non-government organization**, consisting of local-chapters across the world.
- Since its **establishment in November 2013** in Japan, it has provided an annual forum, training programs, competitions.
- In June 2017, **it was accepted as permanent observer by the Committee on the Peaceful Uses of Outer Space (UNCOPUOS)**.
- Its **primary objective** is to help create a world **where space science and technology is used by individuals and institutions in every country**, rich or poor for peaceful purposes and for the benefit of humankind.

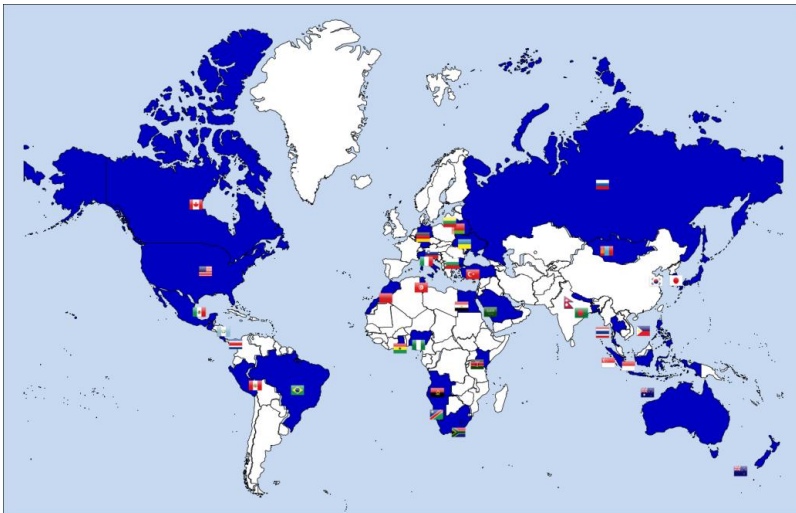


UNISEC stands for
University Space
Engineering
Consortium

UNISEC Local Chapters

POC in 44 regions: Australia, **Bangladesh**, Belarus, Bolivia, Brazil, **Bulgaria**, Canada, Chile, Costa Rica, **Egypt**, El Salvador, **Germany**, Ghana, Guatemala, Indonesia, **Italy**, **Japan**, Kenya, Korea, **Lithuania**, Malaysia, **Mexico**, **Mongolia**, Morocco, Nepal, New Zealand, **Nigeria**, **Peru**, the Philippines, Saudi Arabia, Singapore, **Samara (Russia)**, Slovenia, Spain, **South Africa/Angola/Namibia**, Taiwan, Thailand, **Tunisia**, **Turkey**, Ukraine, USA and Vietnam

(Local Chapter in Red)



15 Local Chapters
and 1 Association of
Local Chapters have
been acknowledged.

Activities of UNISEC-Global

How can we facilitate activities worldwide?

- **Training Program**

- CanSat Leader Training Program (CLTP)



- **Competition**

- Micro/Nano Satellite Mission Idea Contest
- Debris Mitigation Competition



- **Conferences, workshops, and meetings**

- UNISEC-Global Meeting
- Nano-satellite Symposium



CanSat Leader Training Program (CLTP)

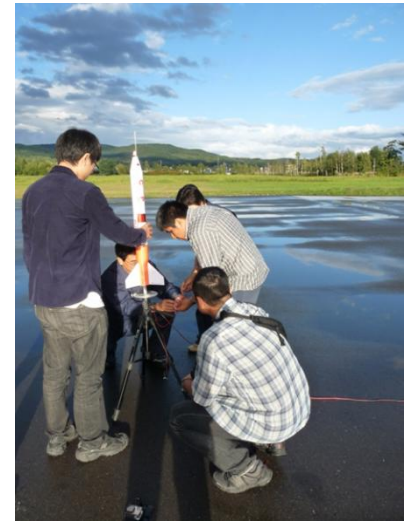


Objective: CLTP is a training program for professors/instructors to learn how to conduct CanSat training by experiencing it. Participants are expected to teach their students after training. It has contributed to capacity building in basic space engineering and technology.

Launched: October 2010

Offered: Annually

Graduated: 73 participants from 34 countries



Launch Experiment



CanSat Manufacturing



Vibration Test



Paper craft Rocket

CLTP History & Participants

73 participants from 34 countries

CLTP1 (Wakayama Univ. in Feb-March, 2011)

12 participants from 10 countries, Algeria, Australia, Egypt, Guatemala, Mexico, Nigeria, Peru, Sri Lanka, Turkey (3), Vietnam.

CLTP2 (Nihon Univ. in Nov-Dec, 2011)

10 participants from 10 countries, Indonesia, Malaysia, Nigeria, Vietnam, Ghana, Peru, Singapore, Mongolia, Thailand, Turkey.

CLTP3 (Tokyo Metropolitan Univ. in July-August, 2012)

10 participants from 9 countries, Egypt (2), Nigeria, Namibia, Turkey, Lithuania, Mongolia, Israel, Philippines, Brazil.

CLTP4 (Keio Univ. in July-August, 2013)

9 participants from 6 countries: Mexico(4), Angola, Mongolia, The Philippines, Bangladesh, Japan.

CLTP5 (Hokkaido Univ. in Sept 8-19, 2014)

7 participants from 5 countries, Korea (2), Peru, Mongolia, Mexico (2), Egypt.

CLTP6 (Hokkaido Univ. in August 24-Sept4, 2015)

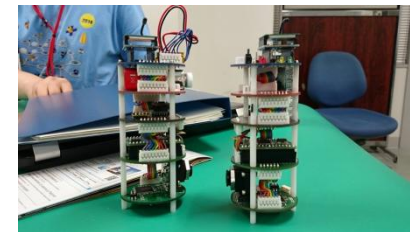
8 participants from 8 countries: Angola, UN(Austria), New Zealand, Tunisia, Turkey, Egypt, Bangladesh, Mexico

CLTP7 (Hokkaido Univ. in Sep 21-Oct 1, 2016)

8 from 7 countries: Egypt, Myanmar, Peru, Nepal (2), Mongolia, Serbia, Dominican Republic.

CLTP8 (Nihon University in Sep 7-16, 2017)

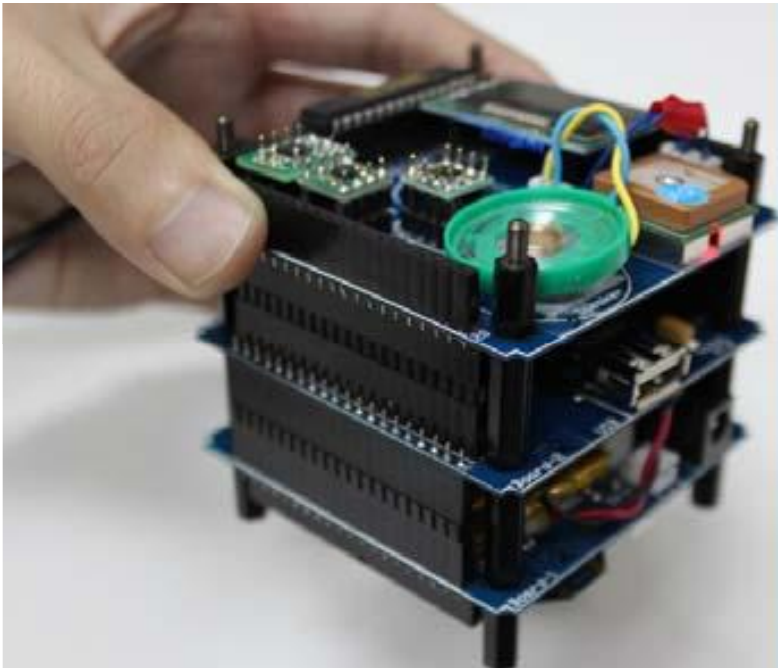
9 from 7 countries: Egypt, Turkey, Bolivia, El-Salvador, Malaysia, Japan (3), Nepal.



HEPTA-Sat

New Satellite Hands-on Training Tool

HEPTA-Sat Workshop will be held in cooperation with the United Nations Programme on Space Applications and with the host country South Africa



United Nations/South Africa Symposium on Basic Space Technology
"Small Satellite Missions for Scientific and Technological Advancement"

STELLENBOSCH, SOUTH AFRICA, 11 - 14 DECEMBER 2017

See http://www.unoosa.org/oosa/en/ourwork/psa/schedule/2017/symposium_southafrica_bsti.html

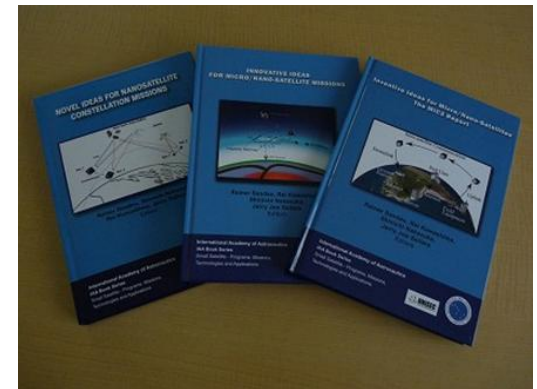
Mission Idea Contest (MIC)

Objective: The Mission Idea Contest (MIC) is encouraging aerospace engineers, college students, consultants, and anybody interested in space to share their ideas on how to use micro/nano/pico satellites, and provides opportunities to present their ideas and gain attention internationally.

Launched: June 2010

Conducted: Annually as PreMIC or MIC

- Regional coordinators from 41 countries
- Four books were published as a part of the IAA book series.



New Challenge in PreMIC5

- 1) Local Competitions are held in 5 regions, namely Japan, Mexico, USA, Germany and Italy, and the winners will get together and make presentation in the PreMIC5 workshop in Rome, Italy.
- 2) Applicants need to be aware that the missions should satisfy any of the [UN Sustainable Development Goals](#).

	Venue
Japan	Kyushu Institute of Technology
Mexico	CUCEI, Universidad de Guadalajara
USA	University of Colorado
Germany	University of Würzburg
Italy	Sapienza- University of Rome



PreMIC5 local competition organized by UNISEC-Japan

**Final Presentation:
Dec 2, 2017, Rome, Italy**

Debris Mitigation Competition(DMC)



- **Objective:** To facilitate the sharing of innovative solutions for debris mitigation and developing effective deorbit devices that can be demonstrated and validated with Micro/Nano-Satellites. It is also expected to increase awareness of debris problems among satellite developers and university students.
- **Launched:** November 2015
- **Conducted:** Annually



2nd Debris Mitigation Competition



- The **objective** is to facilitate the sharing of innovative solutions for debris mitigation and developing effective **post-mission disposal (PMD) and/or active debris removal (ADR)** device that can be demonstrated and validated with a micro satellite.
- **Requirements**
 - The device must be designed for the removal of a potentially non-cooperative lean satellite of 50 kg mass and maximum dimension of 1 meter. Total mass of a satellite and device can exceed 50 kg.
 - The device will enable the satellite to re-entry within 11 years (i.e. one solar cycle) after activating. You can use any systems such as thruster, tether, membrane or electric propulsion.
 - The device will be activated at 00:00:00 UTC, January 1, 2020 with the following orbit element:

Semi-major axis	7128 km
Orbital inclination	98.4 degree
Eccentricity	0.001
R.A.A.N	30 degree
Argument of Perigee	210 degree
Mean Anomaly	190 degree

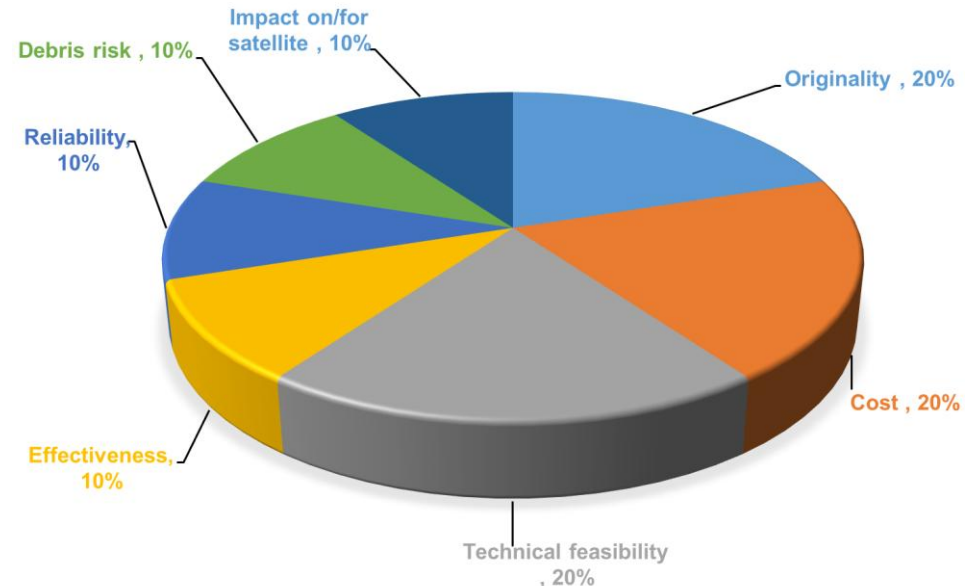
2nd Debris Mitigation Competition

• Timeline



• Evaluation Criteria

Originality (20)
Cost (20)
Technical feasibility (20)
Effectiveness (10)
Reliability (10)
Debris risk (10)
Impact on/for satellite (10)



UNISEC-Global Meeting

- **Objective:** The UNISEC-Global Meeting is an annual gathering to expand university community beyond Japan which intends to promote practical space projects at university level. The meeting includes Local Chapter activities report, Group discussion, Student Session, Competitions and Acknowledgement of new local chapter.



- **Launched:** November 2013
- **Conducted:** Annually

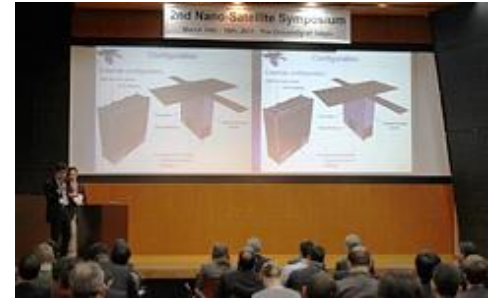
As of August 2017, 15 local chapters have been acknowledged.



Nano-satellite Symposium



- **Objective:** To present and discuss all aspects of micro/nano/pico-satellites including architecture, component technologies, guidance / navigation / control, infrastructure, such as ground station systems and launch opportunity, applications and missions, and regulatory issues.
- **Launched:** February 2010
- **Conducted:** Annually
- The 6th and 8th symposiums are held as one of the programs at the 30th and 31st International Symposium on Space Technology and Science (ISTS), respectively, in Japan and the 9th symposium planned to be held in Australia.



Local Chapter Activities

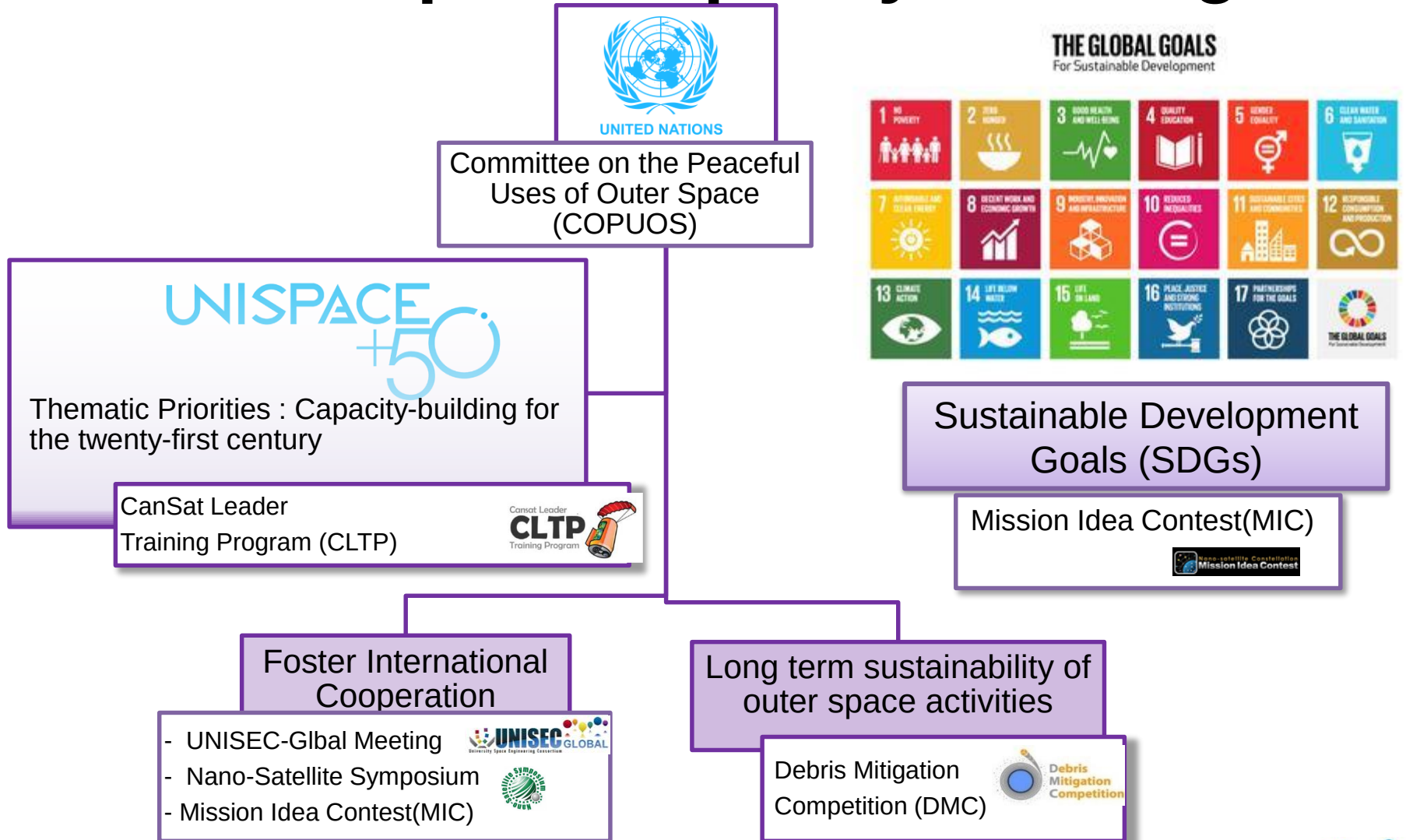
- **National CLTP**
 - Mexico and Turkey
- **CanSat Training Program (CTP)**
 - Egypt, Ghana, Mexico, Mongolia, Nigeria, the Philippines and Peru
- **National CanSat Competition**
 - Lithuania, Mexico, Mongolia, Peru, Philippines and Turkey.
- **Local Mission Idea Contest (PreMic5)**
 - Japan, Mexico, Italy, Germany, USA
- **Other international conference, seminar, workshop**
 - Samara Summer Space School (Samara, Russia)
 - Pina-Workshop (Germany)



Thematic Priorities

- 1. Global partnership in space exploration and innovation***
- 2. Legal regime of outer space and global space governance: current and future perspectives***
- 3. Enhanced information exchange on space objects and events***
- 4. International framework for space weather services***
- 5. Strengthened space cooperation for global health***
- 6. International cooperation towards low-emission and resilient societies***
- 7. Capacity-building for the 21st Century***

UNISEC-Global Contributions to Global Space Capacity Building



Discussion

- How should we set the goal in 2030?
 - The key principle of the 2030 Agenda for Sustainable Development is

“No one will be left behind.”

- QUESTION: Should we say
“No country will be left behind
in capacity building in the field of
space science and technology”?

Backcasting

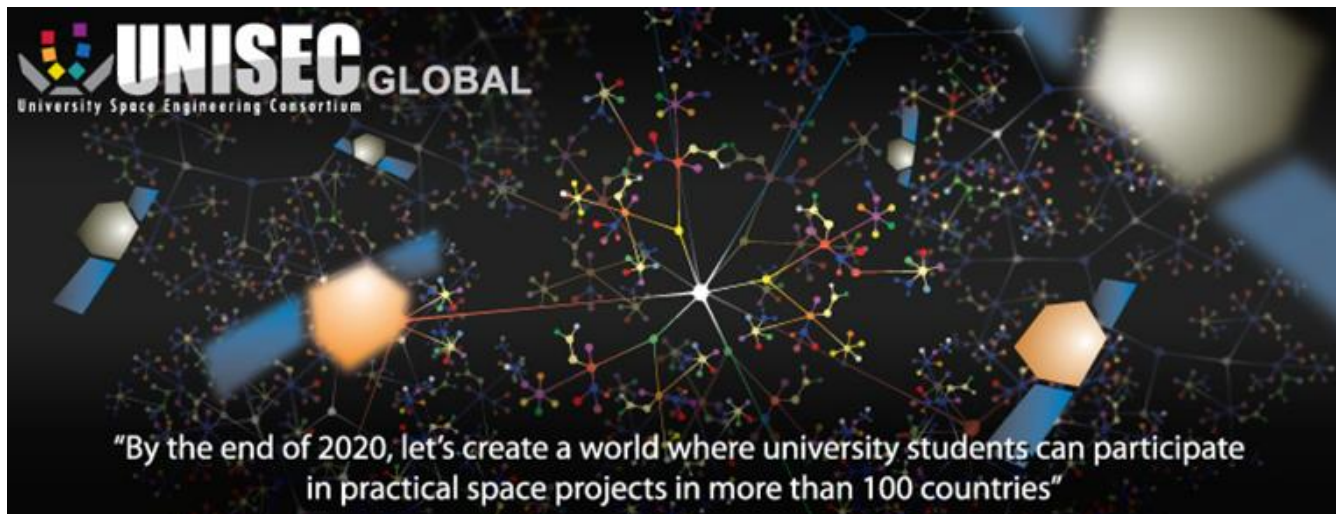
- Backcasting: Reverse-forecasting technique which starts with a specific future outcome and then works backwards to the present conditions.
- Do we wish to realize the world where “University student can participate in practical space projects in all the countries” in 2030?
- If so, what should we do from now?
- We need to consider:
 - Is it a good direction? Do all the countries want it?
 - If so, how can we achieve the goal?

Upcoming Events in 2017

- **5th UNISEC-Global Meeting (Dec 2-4)**
Venue: Sapienza – Università di Rome, Italy
 - **Pre Workshop for 5th Mission Idea Contest**
 - **2nd Debris Mitigation Competition**
- **HEPTA-Sat Workshop(Dec 9-10)**
 - Organized just before the United Nations /South Africa Symposium on Basic Space Technology (Dec 11-14)



Contact

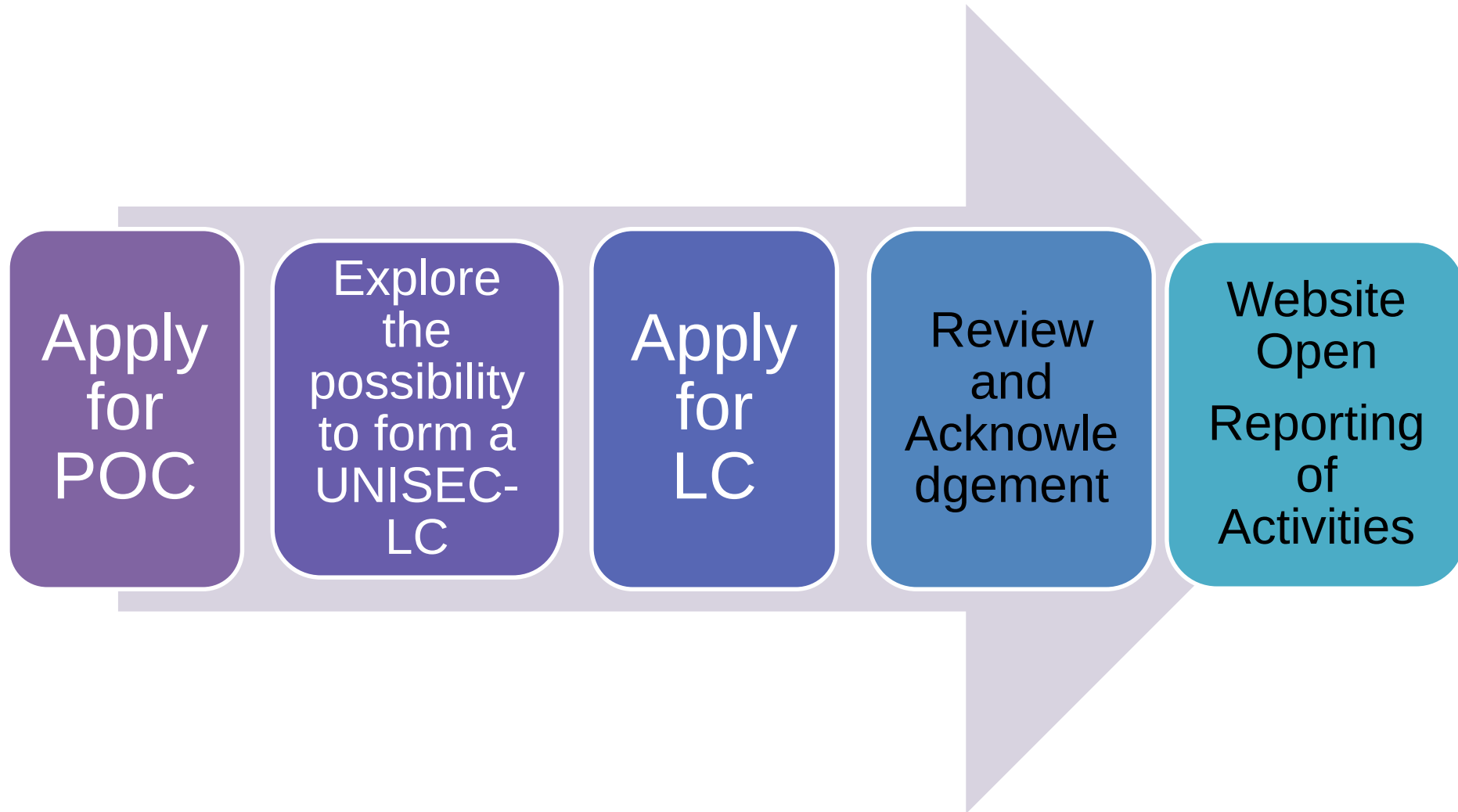


UNISEC-Global Secretariat

C/O UNISEC-Japan,
Central Yayoi 2F, 2-3-2 Yayoi, Bunkyo-ku,
Tokyo 113-0032, Japan
TEL: +81-3-5800-6645
Email: secretariat@unisec-global.org
www.unisec-global.org

Back up slides

Process to Establish Local Chapter



History of Activities

	Year/Activity	CLTP 	DMC/DDC 	MIC 	Nano-satellite Symposium 	UNISEC-Global Meeting 
UNISEC-JAPAN	2010				1 st	
	2011	1 st and 2 nd		1 st	2 nd and 3 rd	
	2012	3 rd		2 nd	4 th	
UNISEC-GLOBAL	2013 	4th		Pre 3rd	5th	1st
	2014	5 th		3 rd		2 nd
	2015	6 th		Pre 4 th	6 th (ISTS30)	3 rd
	2016	7 th	1 st	4 th	7 th	4 th
	2017	8th	2nd	Pre 5th	8th (ISTS31)	5th