
UNISEC Challenge

What we can do for capacity building in space science and technology in developing countries

February 7, 2012

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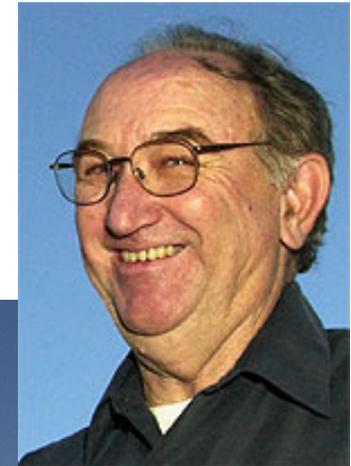
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Introduction-Who are we?



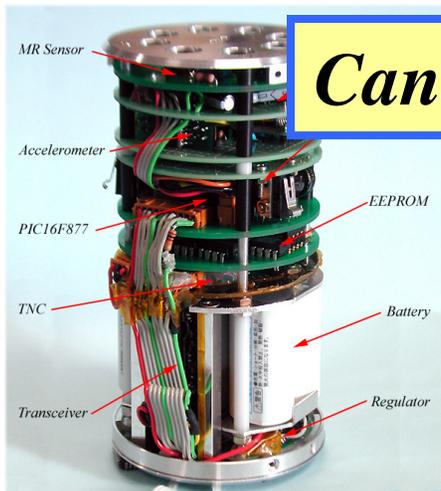
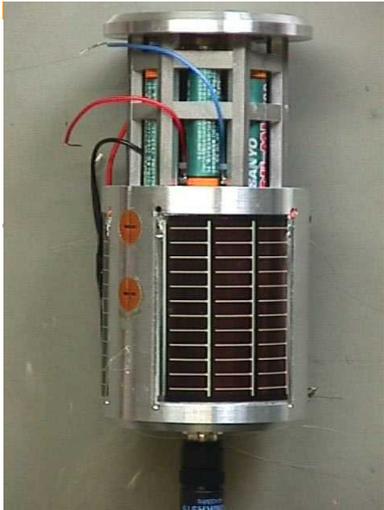
- UNISEC is a non-profitable organization to facilitate and promote practical space development activities, such as designing, developing, manufacturing, and launching micro/nano satellites and hybrid rockets at university level.
- Established in 2002
- 57 laboratories/groups from 38 universities
- About 500 student members and 220 supporters

Background (1) CanSat 1998~

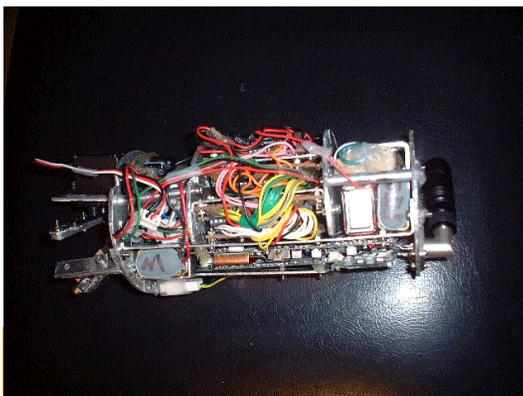


Thanks to
Prof. Bob
Twiggs!



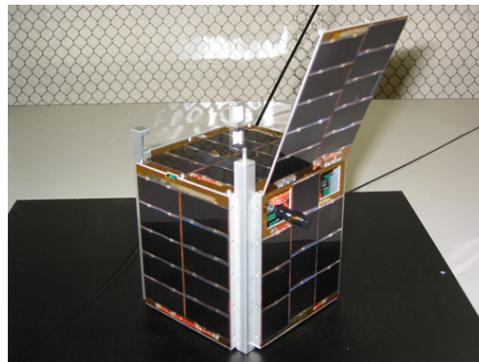
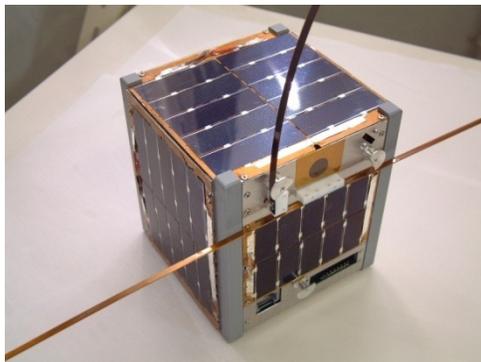


CanSats 1999-



Background (2) CubeSat 1999~

- First CubeSat launch (June 2003)
 - Two Japanese CubeSats (Univ. of Tokyo and Tokyo Inst. of Tech.) worked well.
 - Both satellites are still very healthy in orbit (more than 8 years)
- A total of 15 Japanese university nano satellites were successfully launched up to now.

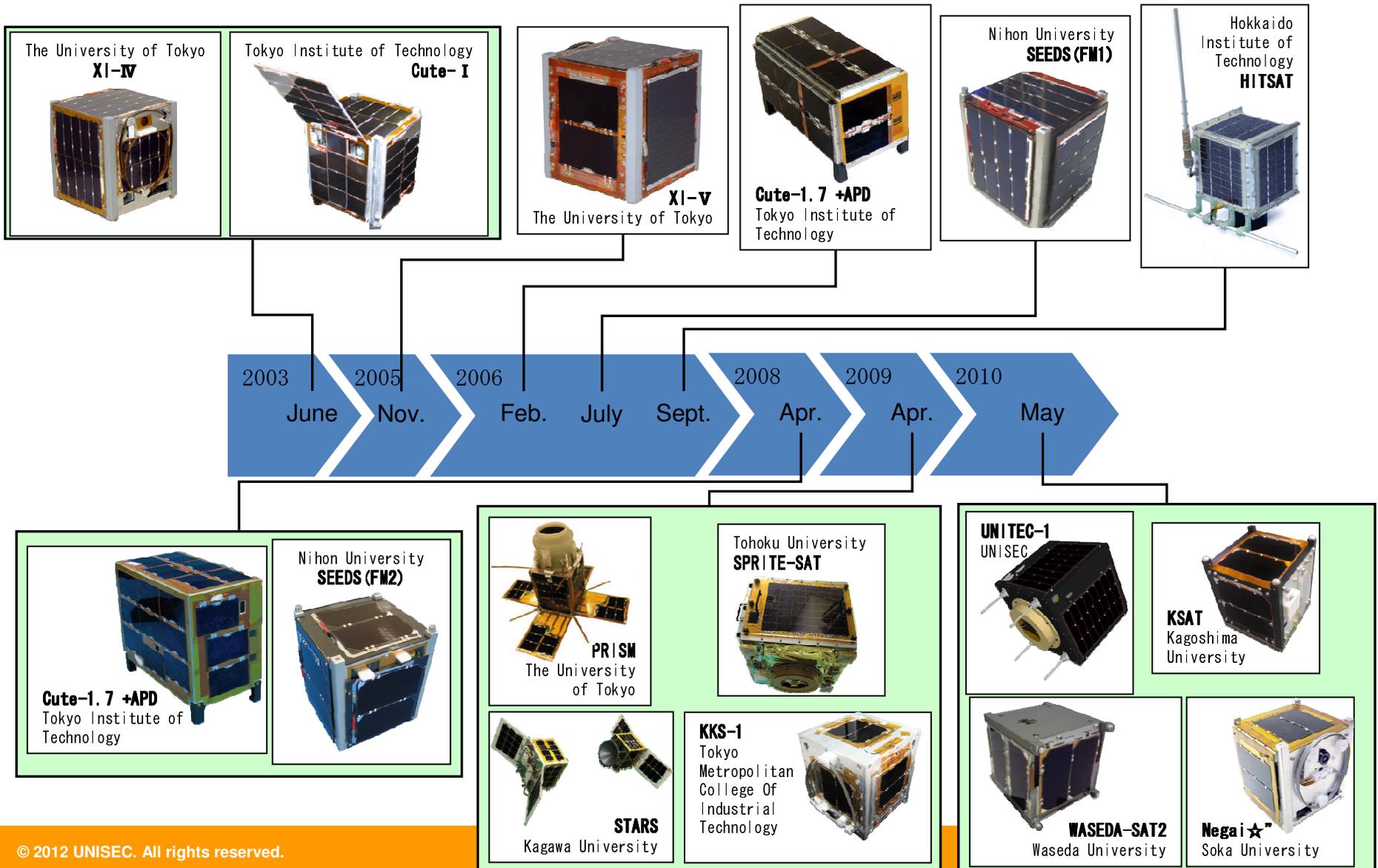


First CubeSat

Left: XI-IV by Univ. of Tokyo

Right: CUTE-I by Tokyo Inst. of Tech.

UNISEC Satellites Development



UNISEC Concept

Three Pillars of UNISEC

1) Human Resource Development

Unique

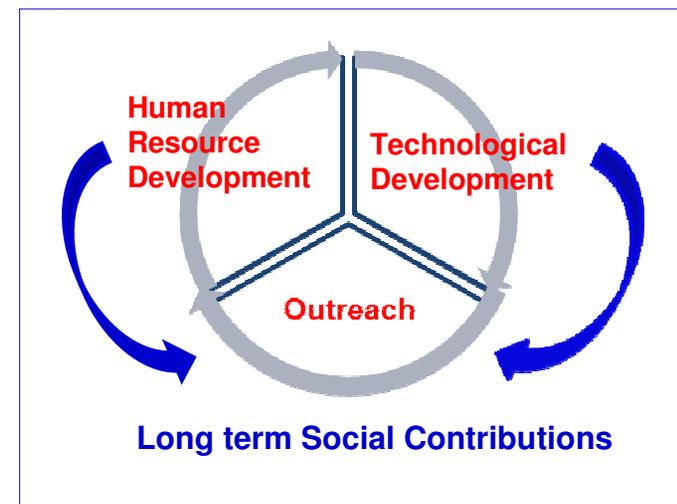
Never give up

Innovative

Sincere

Energetic

Challenging



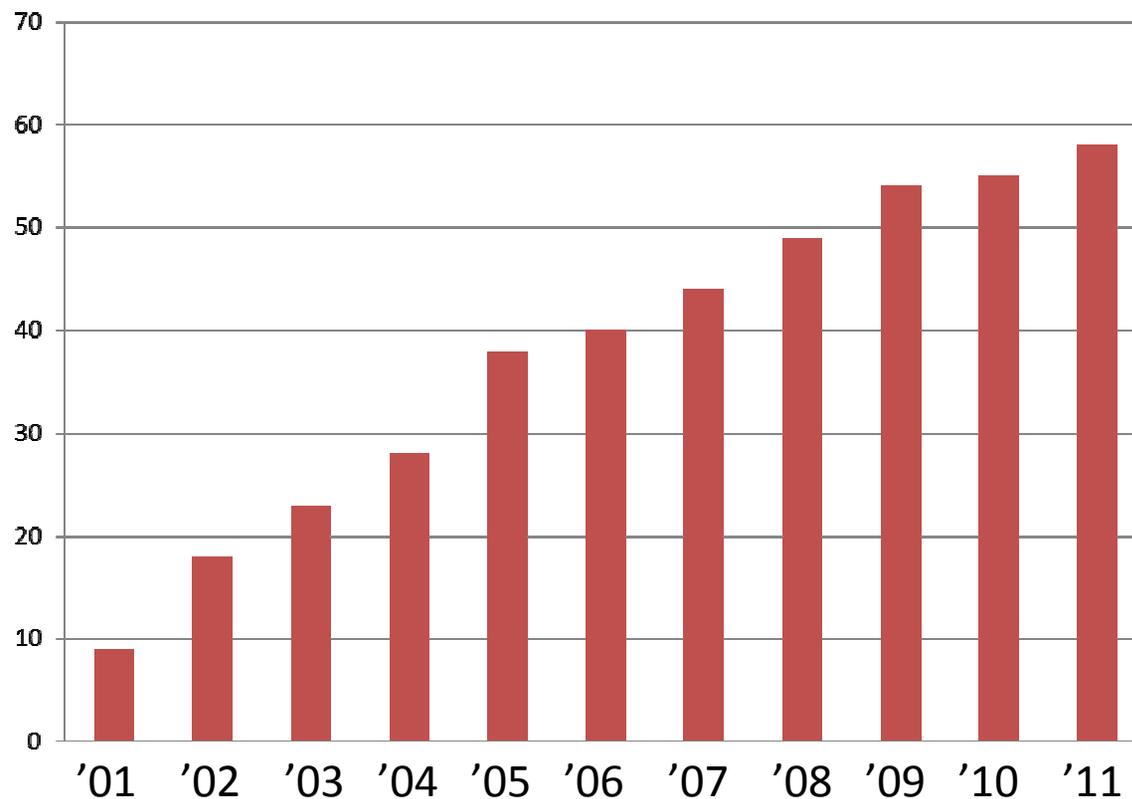
2) Technological Development

3) Outreach

UNISEC Development

Number of Member Laboratories

Started with small number of enthusiastic universities



UNISEC Workshop

Vision 2020-100

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



**Let's establish UNISEC-xxx (your country)
Let's start "UNISEC-International"
together!**

Examples of International Capacity Building Programs

CanSat Leader Training Program

**Mission Idea Contest for Micro/Nano Satellite
Utilization**

Nano-satellite symposium

Background

- The International Capacity Building Programs started as a part of the "*HODOYOSHI* Project"* , which was granted to Prof. Nakasuka by the Japan Society for the Promotion of Science (JSPS) in the "Funding Program for World-Leading Innovative R&D on Science and Technology (FIRST Program)," initiated by the Council for Science and Technology Policy (CSTP) of Cabinet Office, Government of Japan.

*The *HODOYOSHI* Project: The "'Establishment of new paradigm of space development and utilization with nano-satellites introducing Japanese-original "reasonably reliable systems engineering"'



Prof Shinichi
Nakasuka,
The University
of Tokyo



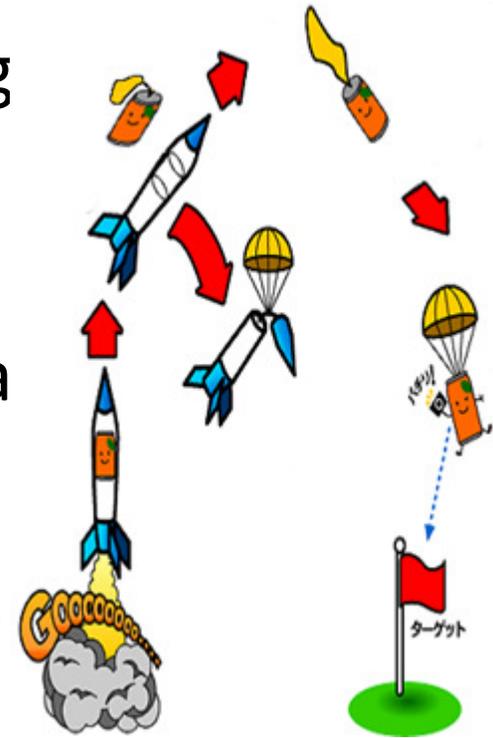
CanSat Leader Training Program

**An Example of
Capacity Building Program
specialized in**

“Hands-on Training in Space Technology ”

What is CanSat?

The CanSat provides an affordable way to make students acquire the basic knowledge about manufacturing a satellite. They will be able to design and build a small electronic payload that can fit inside a coke can. The CanSat is launched and ejected from a rocket or a balloon. With the use of a parachute, the CanSat slowly descends back to earth performing its mission while transmitting telemetry. Post launch and recovery data acquisition will allow them to analyze the cause of success and/or failure.



CanSat Leader Training Program (CLTP)

CLTP was established in 2011 to contribute to capacity building in space technology and to improve teaching methods-based space engineering education.

- A one month course gives training through whole cycle of Can Sat development including sub-orbital launch experiments
- Participants are expected to teach and promote CanSat experiments in their countries
- Aiming at international CanSat education network

“Give a man a fish and you feed him for a day. Teach him how to fish and you feed him for a lifetime.”



Past CLTP participants - 16 countries

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

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

CLTP2 (Nihon Univ. in Nov-Dec 2011)

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

Call for CLTP3 Participants!!

Held in Tokyo

July-August, 2012

<http://www.cltp.info>





The 2nd
Mission Idea Contest
for Micro/Nano-satellite Utilization

Mission Idea Contest for Micro/nano Satellite Utilization (MIC)

**An Example of
Capacity Building Program
specialized in
“Mission Design and Business Model
Development Training in Micro/Nano Satellite”**

Objective and Eligibility

- Objective: Encourage innovative exploitation of micro/nano-satellites to provide useful capabilities, services or data.
- Eligibility: Any individual, group or company with suitable space systems (or business) expertise and an enthusiasm for micro/nano-satellites

Report of 1st MIC: Process and Results

1st round: extended abstract evaluation step

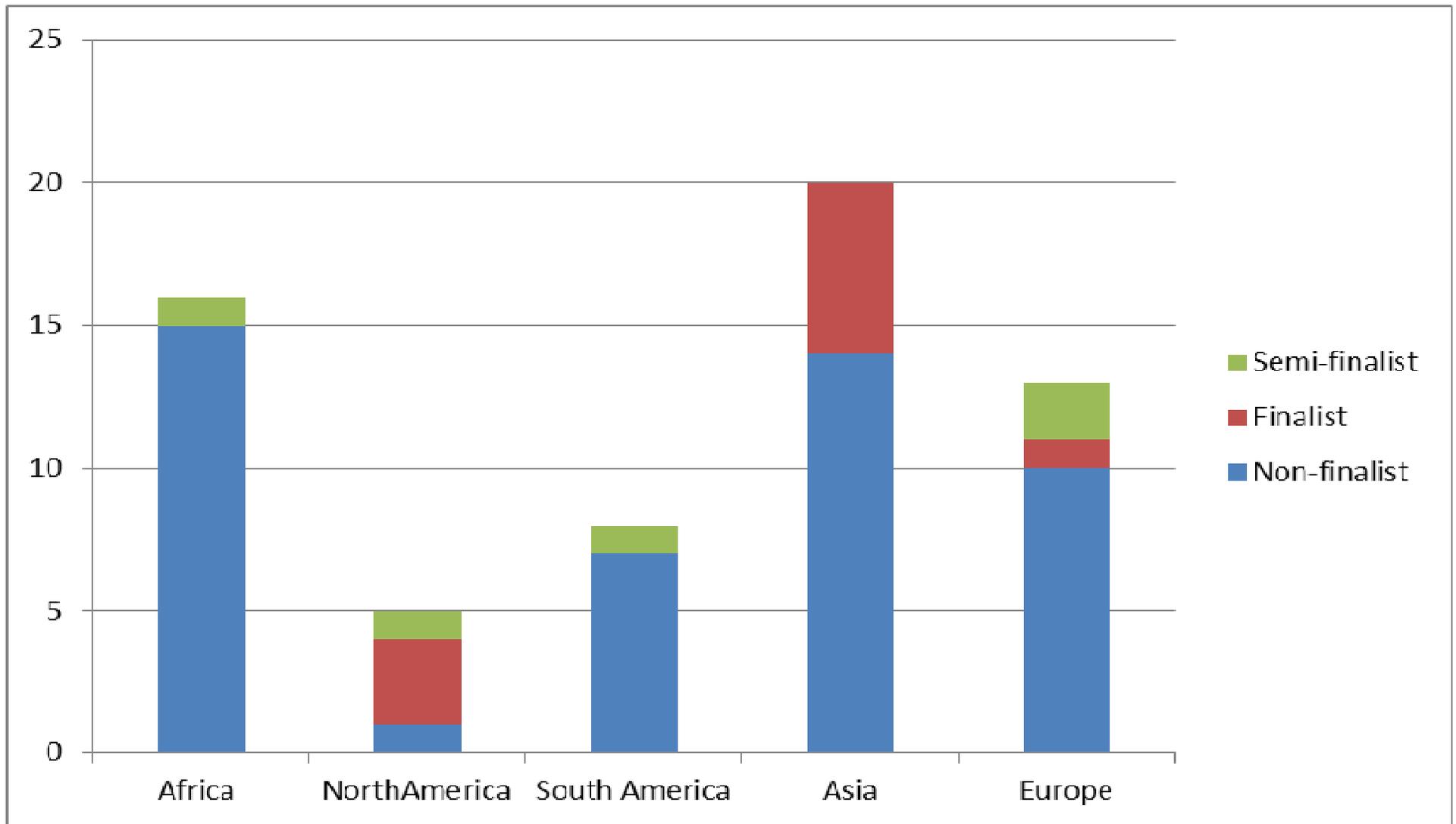
- 62 applications from 24 countries
- 10 finalists and 5 semi-finalists were selected on Jan 20, 2011.

Finalists: Japan2, Canada2, Vietnam2, UK1, Turkey1, Korea 1, USA 1
Semi-finalists: Spain1, South Africa1, Peru1, Ukraine1, USA1

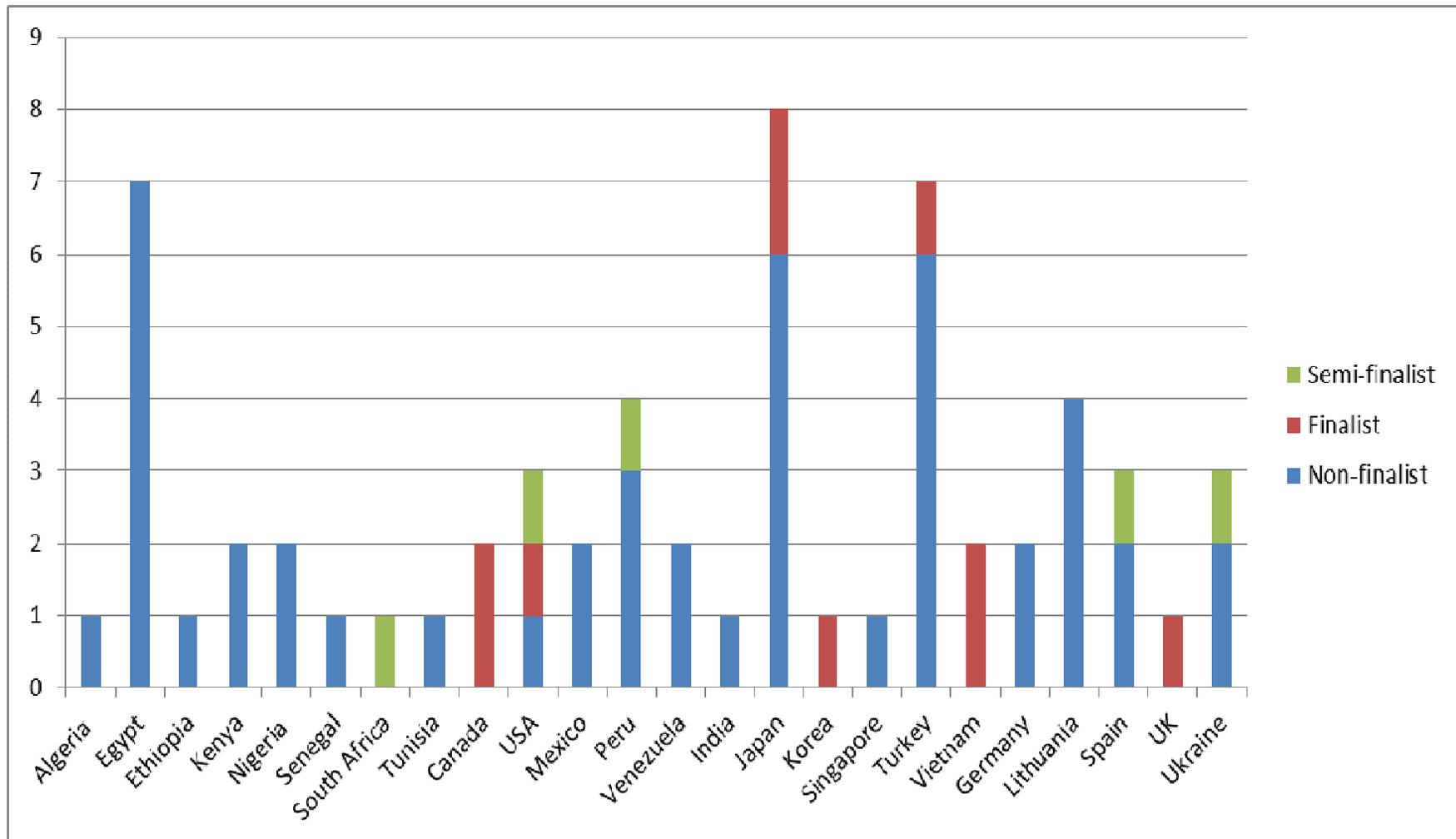
2nd round: paper and presentation step

- 10 finalists made presentation on March 14, and 1-3 places were selected.

Area Distribution of Applicants

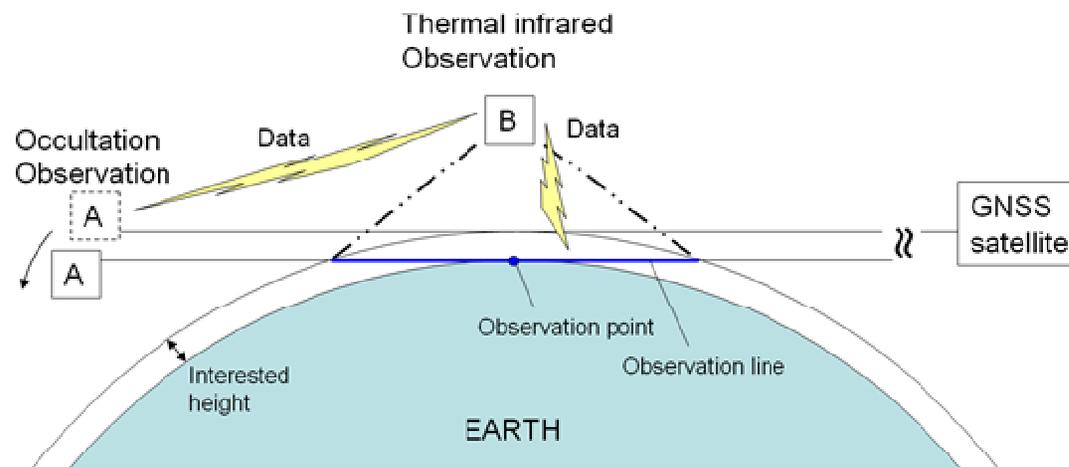


Country Distribution of Applicants



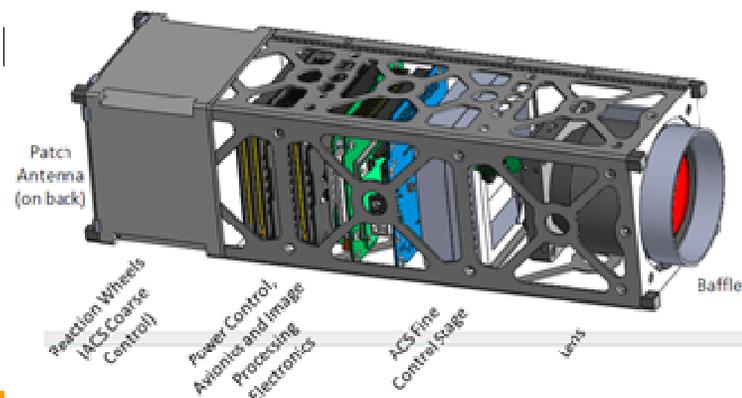
1st place: Integrated Meteorological / Precise Positioning Mission Utilizing Nano-Satellite Constellation (Japan)

- This mission focuses on two needs; **meteorological mission (more accurate rainfall prediction)** and **precise positioning mission** are integrated utilizing nano-satellite constellation. The fundamental components of this mission are two nano-satellites, nano-satellite A that observes GNSS (Global Navigation Satellite Systems) **radio occultation (RO) from edge-on**, and nano-satellite B that acquires **thermal infrared (TIR) images** from the zenith.



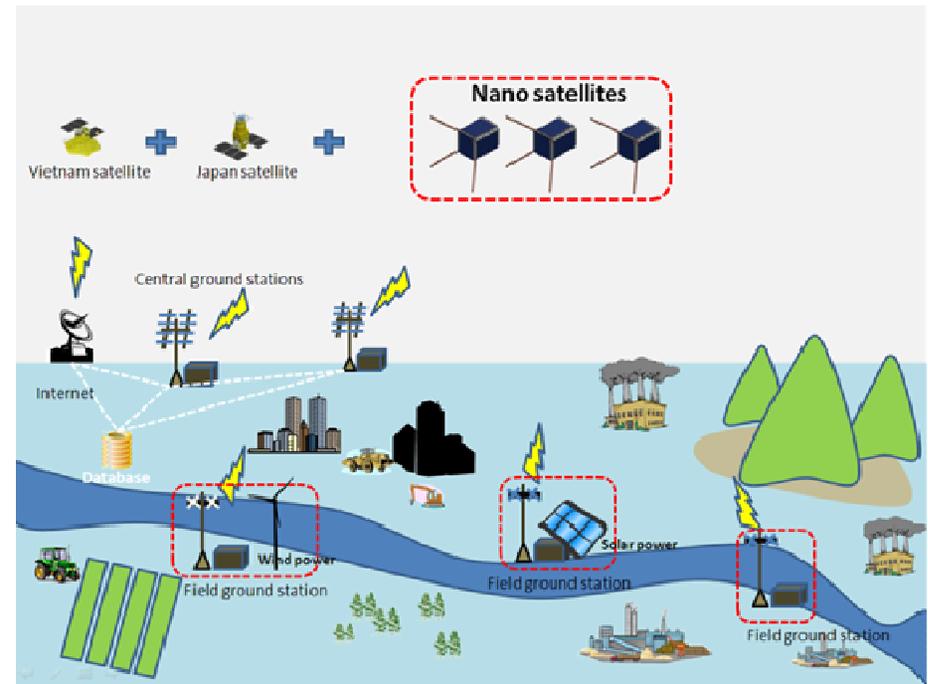
2nd place: ExoplanetSat Constellation(USA)

- Constellation of **3U CubeSat** form factor to search for transiting **Earth-sized planets in front of Sun-like stars** in an attempt to locate a habitable planet. The ExoplanetSat Constellation shall use precision photometry to cooperatively monitor chosen Sun-like stars with a maximum measurement noise of 10 parts per million



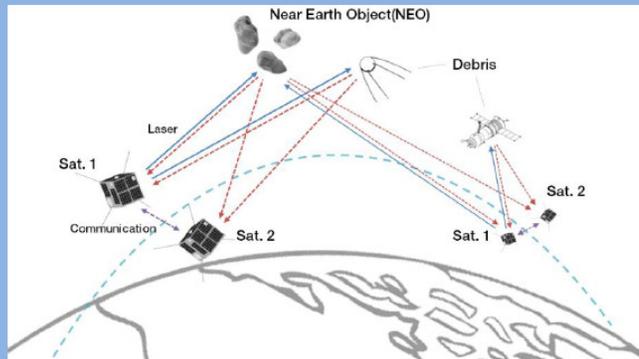
Unique Proposals (Peru and Vietnam) - Water pollution observation -

Vietnam team and Peru team separately proposed to distribute many ground sensors which can continually monitor quality of water (ground water, sea, river, etc), and satellites constellation collect data from ground sensors.



**“Information Collecting
by Multi-Satellites”**

R. Sandau, S. Nakasuka, R. Kawashima, J. Sellers (eds)



Novel Ideas for Nanosatellite Constellation Missions

IAA book series
Small Satellites – Programs, Missions, Technologies and Applications



Publication

Full papers of finalist and semi-finalist will be published as one of IAA book series.

Thanks! IAA

Regional Seminars in 2010



Cairo University, Egypt
August 2, 2010



Instituto de Ingeniería,
UNAM, Mexico
September 10, 2010



NanYang Technological
University, Singapore
September 15, 2010

Held in 15 regions

Use University facilities (convenient and less expensive),
Involve people from diverse background (diverse knowledge),
Invite local people who can really benefit (local contact),
Motivate students with professional's help (educational effect)

Merits of the contest for capacity building

No need for budget

Capacity building from Grass Roots

- All needed is **only time and brain.**
- Anybody, even students, can take initiative to start a project.
- Can start with one person – one person can make a big difference.



The 2nd

Mission Idea Contest

for Micro/Nano-satellite Utilization

Call for Paper
The 2nd Mission Idea Contest
for
Micro/Nano Satellites utilization

Reasons for participation

- Finalists will be invited to make final presentations at the UN Workshop / 4th Nano-satellite symposium in Japan (Nagoya, Japan in October 10-13, 2012)
- Awards and Prize
- The best papers will be published
- High visibility for your ideas and the potential for future collaboration and support
- AGI sponsorship (in limited areas)
 - Satellite Tool Kit (STK) will be licensed to university applicants.
- Feedback from reviewers
 - Short comments to qualified abstracts
 - Top 20 of Category 2 will get feedback to write full paper
 - Feedback for non-finalist who submitted full paper

Changes from 1st MIC

	1 st MIC	2 nd MIC
Satellite mass	< 15 kg	<50 kg
Number of satellites	2 or more than 2 (constellations only)	1 or more than 1 (no requirement for constellations)
Category	Only 1 category: Mission idea for nano-satellite constellation	2 categories: 1) Mission idea and satellite design 2) Mission idea and business model (new category!)

Schedule for 2nd Mission Idea Contest

1st round: extended abstract evaluation step

- **May 1, 2012 Abstract Deadline**

- July 1, 2012 Selection of Finalist

Free Ticket
to Japan!

2nd round: paper and presentation step

- Sep 1, 2012 Final Paper Deadline

- **Oct 10, 2012 Final Presentation** at the UN workshop / 4th Nano-satellite Symposium (in Nagoya)

- Regional seminars are held until April 2012.

<http://www.spacemic.net>

Awards

Contest Award

- 1st and 2nd place in Category 1 and 2

IAA Award for environmental issues

- Most imaginative application of micro/nano satellite technologies to environmental issues for the benefit of humankind

Student Prize (for Category 1 only)

- Best proposal in Category 1 (Mission Idea and Satellite Design) submitted by a student, a student group or a University with involvement of a significant number of students

IAA: International Academy of Astronautics

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Nigeria



Igor V. Belokonov
Samara State Aerospace University,
Russia



Sawat Tantiphawadi
NSTDA
Thailand



Velibor Vukasinovic
UVIS, Serbia

Global network through MIC and CLTP (MIC:29 countries, CLTP:16 countries) 34 countries in total



★: CLTP participant ★: MIC coordinator

Nano-Satellite Symposium

**An Example of
Capacity Building Program to offer
Opportunities to exchange knowledge and
information as well as to promote nano-satellite
activities.**

Nano-satellite Symposium

The Nano-Satellite Symposium is an academic meeting for the purpose of promoting technological development of the nano-satellite and its application, as well as enhancing awareness of its importance.



Brief History of Symposium

- The 1st Symposium was held at the University of Tokyo in June 2010, participated by about 300 from 13 countries.
- The 2nd Symposium was also held at the same university in March 2012. Unfortunately the Great East Japan Earthquake happened three days before the opening of the Symposium, and consequently resulted in a shortened schedule.
- About 85 participated in it from 21 countries.
- The 3rd Symposium was held in Kitakyushu in December 2011, with the attendance of about 220 from 31 countries and 2 international organizations.



United Nations/Japan Workshop on Capacity Building in Space Technology Development

Under the Basic Space Technology Initiative (BSTI) of the United Nations Programme on Space Applications

Oct. 10-13, 2012

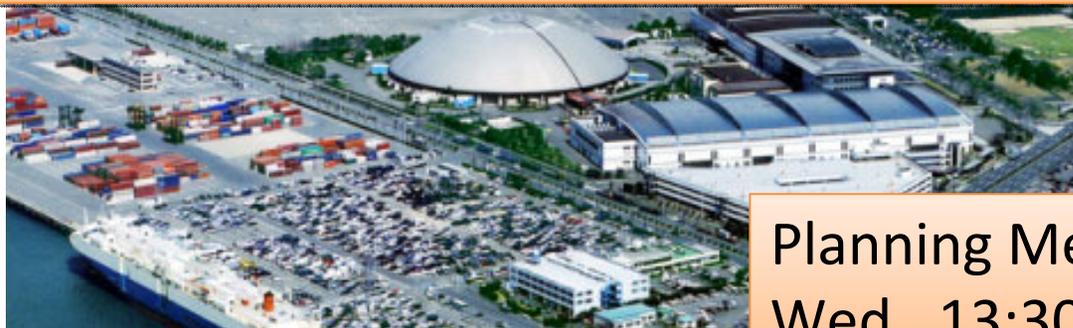
NAGOYA, Japan



THE UNIVERSITY OF TOKYO



<http://www.unoosa.org/oosa/en/SAP/bsti/japan2012.html>
<http://www.nanosat.jp>



Planning Meeting Feb 8,
Wed., 13:30-15:00, M0E27

Call for Paper

- The 4th Symposium will be held in Nagoya in October 2012, cohosted by UN/OOSA and the University of Tokyo when the Japan International Aerospace Exhibition (JA2012) will be also held at the same venue. <http://www.nanosat.jp>

- Topic 1: Satellite Architecture and Technologies
- Topic 2: Innovation in Satellite Development Process
- Topic 3: Utilization/Application of Micro/Nano-Satellites
- Topic 4: Standardization
- **Topic 5: Implementation Strategies for Sustainable Educational Structure**

UN Space Technology Education Curriculum Working Session, Nano-satellite exhibition booth at JA2012 and **UNISEC-International Kick-off meeting** are also planned

Vision 2020-100

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

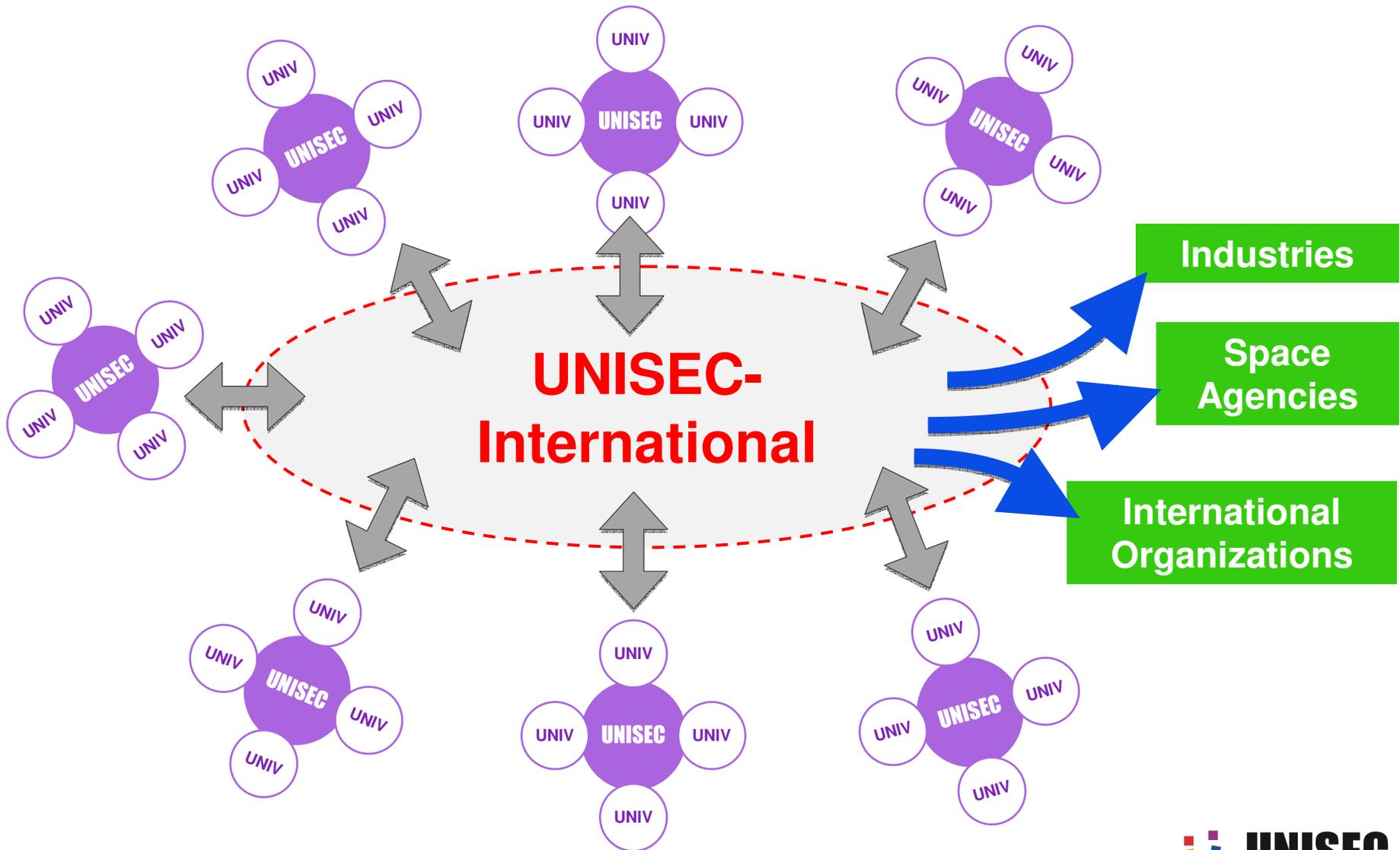


**Let's establish UNISEC-xxx (your country)
Let's start "UNISEC-International"
together!**

Future Perspectives – UNISEC International

- UNISEC-like organization will be formed in each country, and International universities network will be made.
 - We (Japanese UNISEC) support each country to establish “UNISEC-xxxx (name of region/country).”
 - Pre-meeting with 15 countries was held in Kitakyushu, Dec 14, 2011.
 - Kick-off meeting will be held during UN Workshop/4th Nano satellite symposium
- “UNISEC-International” will be organized when several “UNISEC-xxxx”s are ready.

Concept of UNISEC-International



Conclusion – What we can do (1)

- With Vision 2020-100, “By the end of 2020, let’s create the world where university students can participate in practical space projects in more than 100 countries,” UNISEC is working on several international capacity building programs such as Cansat Leader Training Program (CLTP), Mission Idea Contest for Micro/nano Satellite Utilization (MIC) and Nano-satellite Symposium.

Conclusion –What we can do (2)

- Forming association of Universities is effective to facilitate and motivate students as well as to work on financial, legal and technological matters of space projects. We are willing to support to establish UNISEC-like organization in your country by sharing our experiences.

Suggestion- What (only) you can do

- Capacity building programs should be modified to meet culture, students' mentality, educational system and circumstances of each country. Only you – who understand your country's situation can design and modify the programs to fit your people.
- Please consider to join [UN/Japan Workshop](#) held in Oct 10-13, 2012. You will find many hints and opportunities for capacity building in space science and technology in your country.

Contact

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