# Research and Practice on GNSS Education Capacity Building

13th Meeting of the International Committee on Global Navigation Satellite Systems

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November, 2018 Xi'an, China

1 Introduction

2 GNSS Education Capacity Building

3 Practics of BeiDou/GNSS Education

# *What is "Capacity Building"?*

- ***Capacity Building*** *(or* ***capacity development****) is the process by which individuals and organizations obtain, improve, and retain the* ***skills, knowledge, tools, equipment and other resources*** *needed to do their jobs competently or to a greater capacity (larger scale, larger audience, larger impact, etc).*

*（From Wikipedia）*

# *Why is Capacity Building Needed ?*

- *The issue of capacity is critical and the scale of need is enormous, but appreciation of the problem is low.*
- *The link between needs and supply is weak.*
- *There is a lack of realistic funding.*
- *Training institutions are isolated - communications are poor.*
- *Development of teaching materials is inefficient.*
- *Alternative ways of capacity building are not adequately recognized.*

# *The Proposal of GNSS Education Capacity Building*

- *In 2008 of ICG-3 meeting, the Working Group C was renamed from "Information Dissemination" to "**Information Dissemination and Capacity Building**". Its scope of work includes:*

  *1) maintaining the ICG Information Portal;*

  *2) providing support for education and training on GNSS for capacity building in developing countries;*

  *3) organizing workshops and special sessions on the use of GNSS technologies as tools for scientific applications.*

# *The Proposal of GNSS Education Capacity Building*

- *In 2015 of ICG-10 meeting, the Working Group C considered the possibility of changing the Working Group's title and proposed the following title "Global Navigation Satellite Systems (GNSS)* ***Capacity Building, Education and Outreach****".*

- *In 2017 of ICG-12 meeting, the Working Group C recommended that further* ***research on definition of capacity building*** *and workforce index should be undertaken.*

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# *GNSS Education Capacity*

- ***GNSS Education Capacity*** *is a set of capacities, which includes:*

  *1) Education resources* ***input****: Human, material and financial resources.*

  ***2) Output*** *capacity: Education and training activities and products.*

  ***3) Support*** *capacity: Policy, environment, organization and management.*

# *GNSS Education Capacity*

- ***GNSS Education capacity** is composed of*

  *1) Educational resource mobilization capacity: Policy, resource mobilization and environmental support.*

  *2) Teaching outreach supply capacity: Creation, publication, information dissemination, and teaching activities.*

  *3) Service delivery capacity: Management, investment, organization and infrastructure.*

# *GNSS Education Capacity Building*

- ***GNSS Education Capacity Building*** *is a systematic project*

  *1) under conditions of adequate educational funding, reasonable staffing and operational infrastructure;*

  *2) under conditions of continuous optimization of policy environment and organizational management;*

  *3) outputs and services such as activities and products that may be provided.*

# *GNSS Education Capacity Building*

- ***Elements of GNSS Education capacity building***

  ***1) Teacher team building****: Qualified teachers, management team, invited international/domestic experts.*

  ***2) Teaching activities:*** *Degree program(undergraduate education and postgraduate education), training courses (thematic training and series of training, popular science training and professional training, long-term training and short-term training), academic lectures, professional visits.*

# *GNSS Education Capacity Building*

- ***Elements of GNSS Education capacity building***

  ***3) Infrastructure construction****: School buildings (classroom, office, laboratory, library, canteen, dormitory, sports ground), teaching and experimental equipment.*

  ***4) Educational environment****: Educational platform, experimental teaching conditions and practical teaching base.*

  ***5) Information dissemination****: Website, publications, textbook and teaching materials.*

# *GNSS Education Capacity Building*

- ***Elements of GNSS Education capacity building***

  ***6) Funding support****: Government funding, social fund-raising, crowdfunding, and collaborative projects funding, for management, research and activities.*

# GNSS Education Capacity Building

- ***Evaluation indicators***

| Evaluation indicators (Level I) | Evaluation indicators (Level II) |
|---|---|
| **Teacher team building** | Qualified teachers |
| | Management team |
| | Invited experts |
| **Teaching activities** | Degree program |
| | Training courses |
| | Academic lectures |
| | Professional visits |
| **Infrastructure construction** | School buildings |
| | Teaching equipment |
| | Experimental equipment |
| **Educational environment** | Educational platform |
| | Experimental teaching conditions |
| | Practical teaching base |
| **Information dissemination** | Website |
| | Publications |
| | Textbook & teaching materials |
| **Funding support** | Government funding |
| | Social fund-raising |
| | Crowdfunding |
| | Collaborative projects funding |

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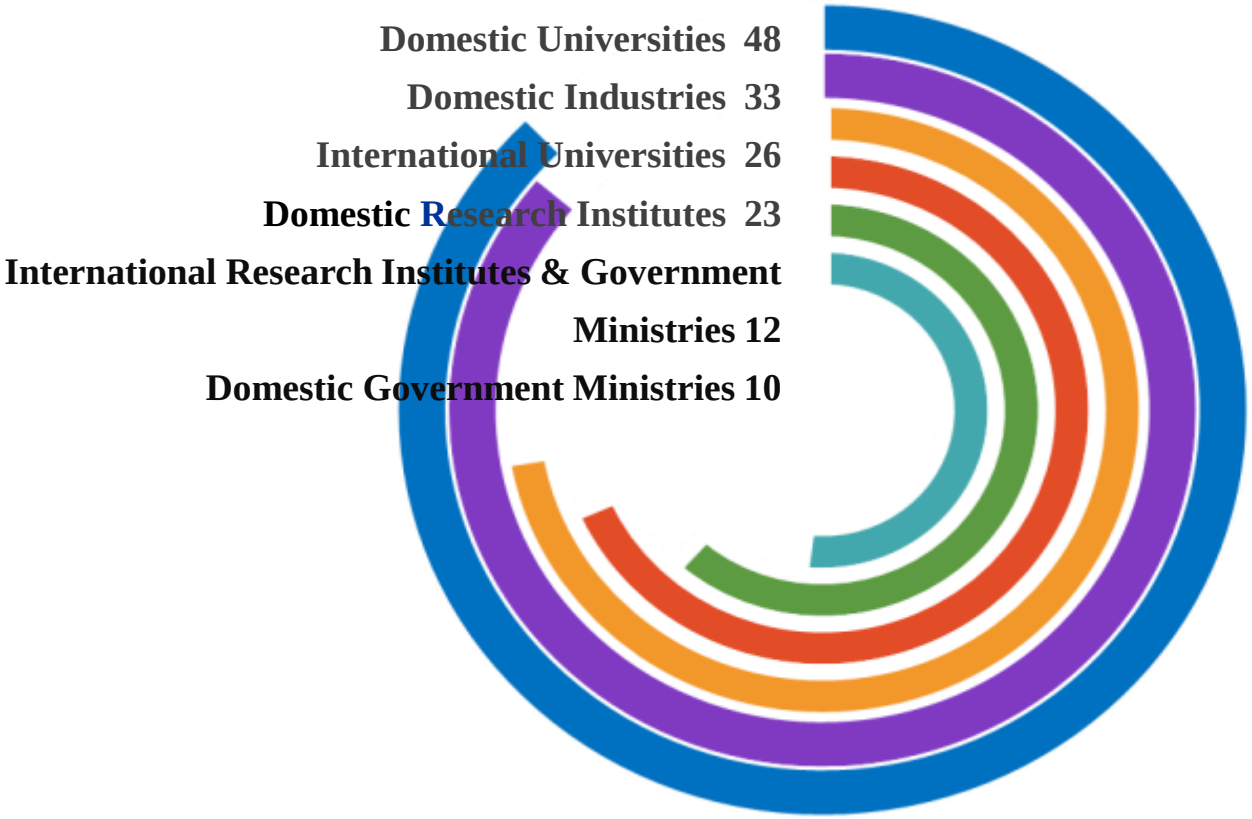
# *Our Practice*

- ***Teacher team building***




**Globalization of Faculty**

# GNSS Education Capacity Building in China

**International Professors/Experts**

# GNSS Education Capacity Building in China

**Domestic Professors/Experts**

# GNSS Education Capacity Building in China

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**Deputy Director** of BD-IETC

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**Senior Expert** on GNSS of RCSSTEAP

**Gong Haoqin**

**Art Planning Director** of RCSSTEAP

**Wang Xin**

**Brand Design Director** of RCSSTEAP

## Management team

# *GNSS Education Capacity Building in China*

- ***Financial support***

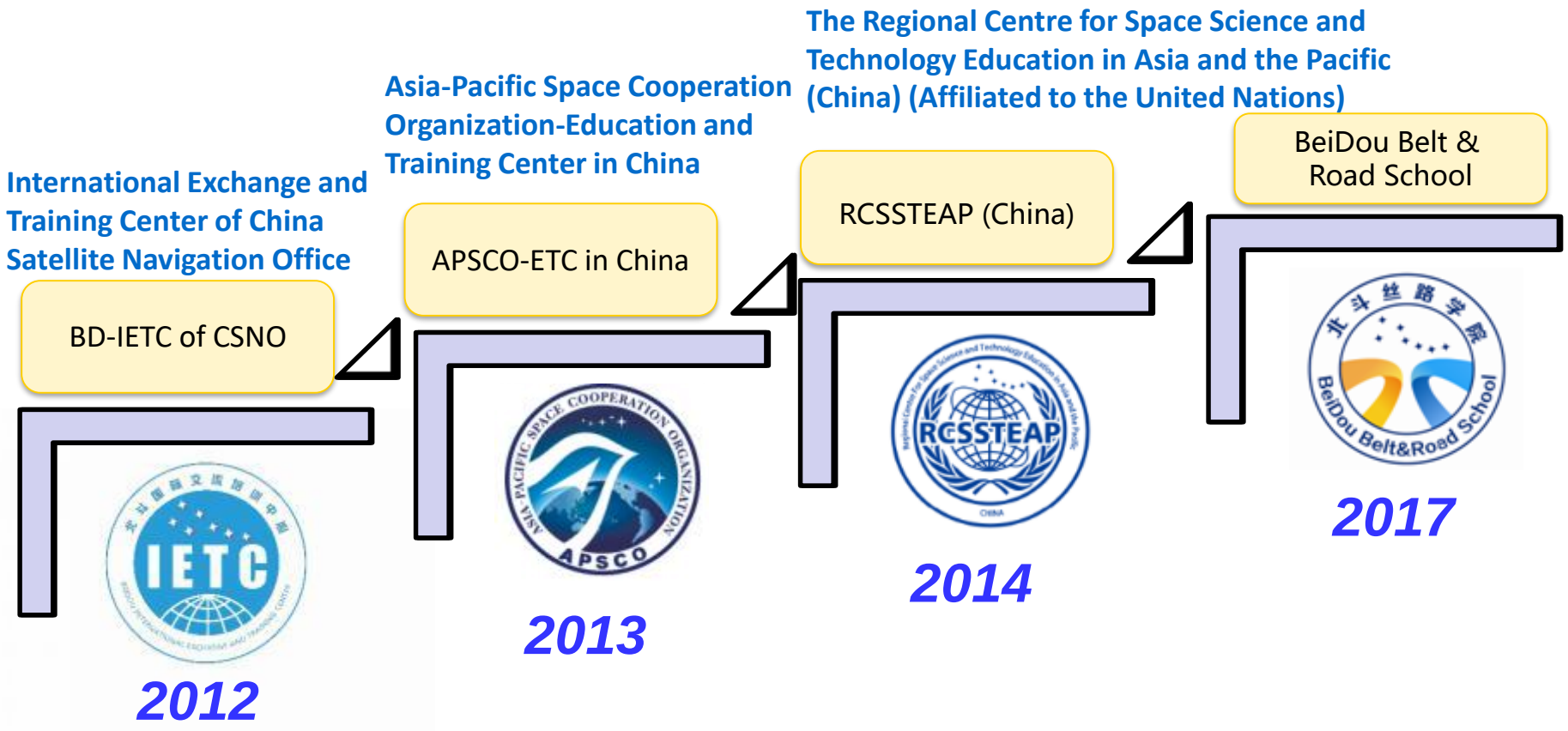
**Supported by Chinese Government,**
**GNSS industry and University**

# *GNSS Education Capacity Building in China*

- ***Infrastructure construction***

# GNSS Education Capacity Building in China

- ***Educational environment***



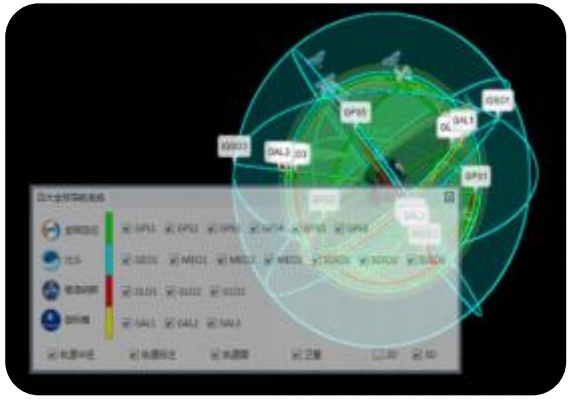

**GNSS Education Platforms**

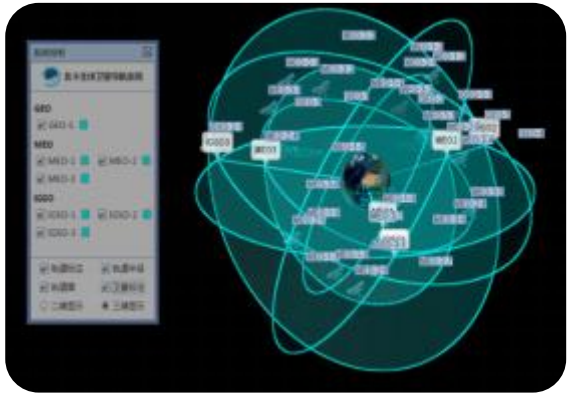
# GNSS Education Capacity Building in China

BDS Exhibition Hall

Smart Classroom

Experiment equipment





Courseware/Tools

**Experimental teaching conditions**

# GNSS Education Capacity Building in China

- Experts/Lecturers
- Professional Visit
- Project

## Map of Partners

**Practical teaching base**

# GNSS Education Capacity Building in China

- ***Information Dissemination***

**RCSSTEAP Website**

- Information Dissemination
- Distance Education
- Research Services
- Communication Community

**BeiDou Education and Research Network**

# GNSS Education Capacity Building in China

**Publications**

# *GNSS Education Capacity Building in China*

**Publications**

# *GNSS Education Capacity Building in China*

**GNSS Textbook & training Materials**

# GNSS Education Capacity Building in China

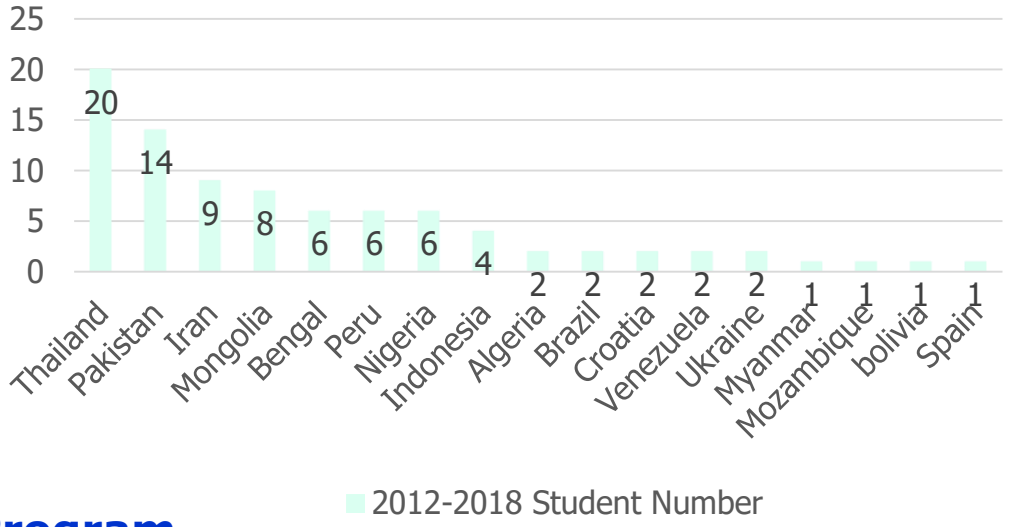
- ***Teaching activities***

| GNSS Core Course | Class Hrs |
|---|---|
| GNSS Reference System | 18 |
| Principle of Global Navigation Satellite Systems | 32 |
| GNSS Navigation Signal | 18 |
| GNSS Receiver Principles and Design | 32 |
| GNSS/INS Integration Navigation | 32 |
| Global Satellite Navigation System Applications | 18 |
| Satellite Navigation Data Processing | 32 |
| GNSS Experiment | 18 |
| GNSS New Technologies | 18 |

- **Enrolment**

| Year | Number | Countries of Participants |
|---|---|---|
| 2016 | 11 | Algeria, Bolivia, Brazil, Croatia, Iran, Nigeria, Peru, Thailand, Ukraine, Venezuela |
| 2017 | 11 | Bangladesh, Bolivia, Mongolia, Pakistan, Peru, Thailand, Turkey |
| 2018 | 6 | Ethiopia, Peru, Turkey, Iran, Pakistan |

- **Degree Award**




**GNSS Degree Program**

# *GNSS Education Capacity Building in China*

| Year | Number of training | Number of trainee | Number of countries |
|---|---|---|---|
| 2015 | 2 | 111 | 15 |
| 2016 | 4 | 182 | 36 |
| 2017 | 3 | 114 | 21 |
| 2018 | 4 | 269 | 13 |

**GNSS Short Term Training (Totally 13, 2015-2018)**

# GNSS Education Capacity Building in China

**Academic Lectures & Professional Visits**

# *GNSS Education Capacity Building in China*

## **UGII** — *New Mode for GNSS Education Capacity Building*

**U** ——Hosted by **U**niversity

**G** ——Supported by Chinese **G**overnment

**I** ——Work with Related **I**nternational Organizations

(UNOOSA, APSCO, etc.)

**I** ——**I**ndustry/Enterprise Participation

# *Capacity Building Index.....*

- Besides Education, capacity building should include the other areas, such as:
  - ✓ Research and development
  - ✓ Manufacture of HW and SW
  - ✓ Experiment facilities
  - ✓ Management
  - ✓ Quality guarantee
  - ✓ Security and environment
- Capacity Building index need to consider the weighty rate of different factors and give each factor a mark in order to put it into implementation
- Regional center could work together to prepare this index jointly and test its applications to facilitate GNSS development in respective region

# Thank you for your attention

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