



# Research and Practice on GNSS Education Capacity Building

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

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Beihang University, Beijing, China

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**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.*

# **1** Introduction

## **2** GNSS Education Capacity Building

## **3** Practics of BeiDou/GNSS Education

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

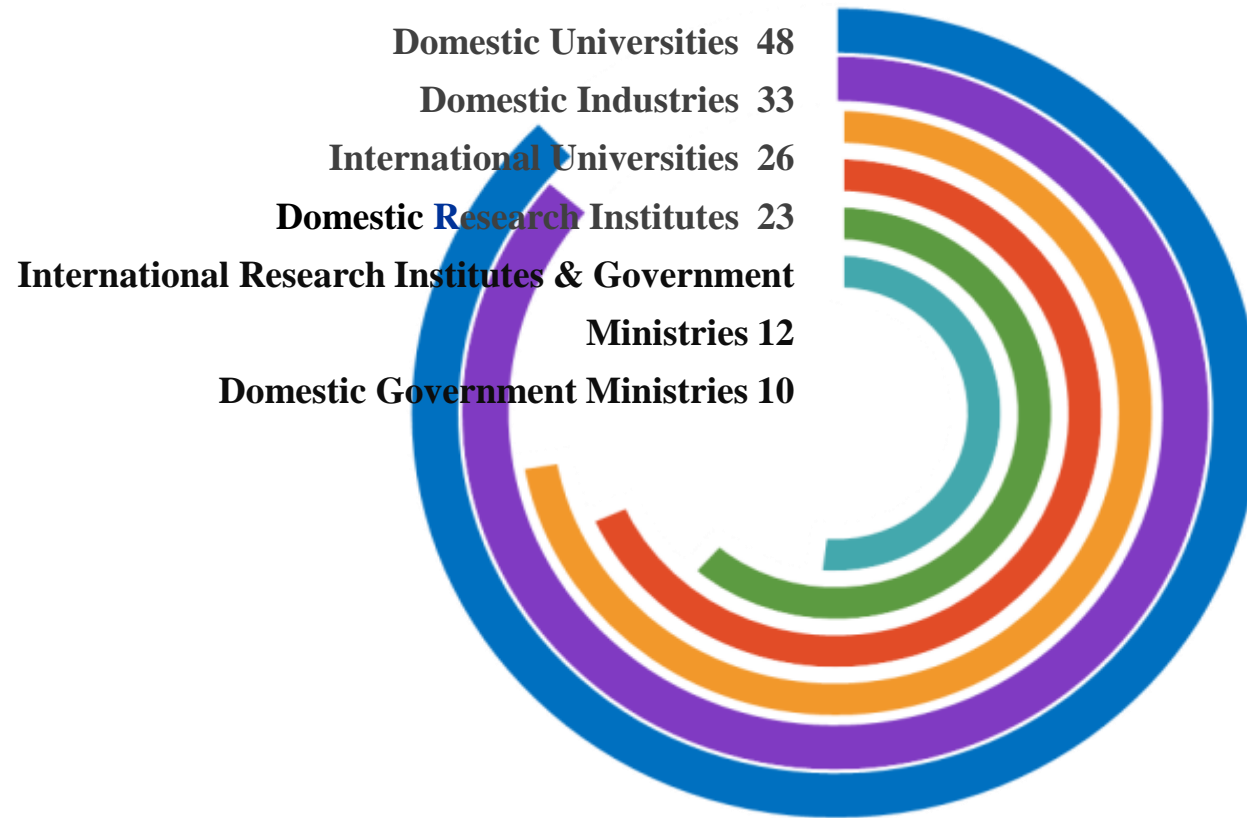
# **1** Introduction

## **2** GNSS Education Capacity Building

### **3** Practics of BeiDou/GNSS Education

# Our Practice

- *Teacher team building*



## Globalization of Faculty



# *GNSS Education Capacity Building in China*



Ms. Mazlan Otgman  
Former Director of UNOOSA



Mr. Sergio Camacho  
Former Director of UNOOSA



Mr. Niklas Hedeman  
Doctor UNOOSA



Mr. Shirish Ravan  
UN-SPIDER Beijing Office



Mr. Christophe Macabiau  
ENAC, France



Ms. Gabrynowicz  
Professor, U.S.A



Mr. Maarten Uijt de Haag  
Ohio University, U.S.A.



Mr. Stephan  
Hobe University of Cologne, Germany

## **International Professors/Experts**

# *GNSS Education Capacity Building in China*



Mr. Yang Yuanxi  
Academician of Chinese Academy of Sciences



Mr. Han Chunhao  
Beijing Satellite Navigation Centre



Mr. Jing Guifei  
Deputy Director of NRSCC



Mr. Wang Jinnian  
China RSGeoinformatics Co., Ltd.



Mr. Zhuang Fengyuan  
Beihang University



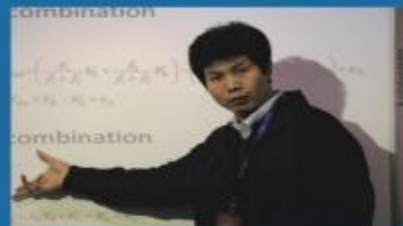
Mr. He Linshu  
Beihang University



Mr. Yang Dongkai  
Beihang University



Mr. Weng Jingnong  
Beihang University



Mr. Wu Falin  
Beihang University



Mr. Jin Tian  
Beihang University



Ms. Li Suju  
National Disaster Reduction Center



Mr. Zhao Yun  
Hongkong University

## **Domestic Professors/Experts**

# *GNSS Education Capacity Building in China*



**Weng Jingnong**

**Executive Director** of the Regional Centre (RCSSTEAP)



**Jing Guifei**

**Dean** of BeiDou Belt & Road School



**Guo Yuanyuan**

**Director** of the General Office of RCSSTEAP



**Cui Yizhuo**

**Project manager** of the General Office of RCSSTEAP



**Wu Ke**

**Project manager** of the General Office of RCSSTEAP



**Yang Dongkai**

**Deputy Director** of BeiDou International Exchange and Training Centre (BD-IETC)



**Jin Tian**

**Deputy Director** of BD-IETC



**Xiu Chundi**

**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**

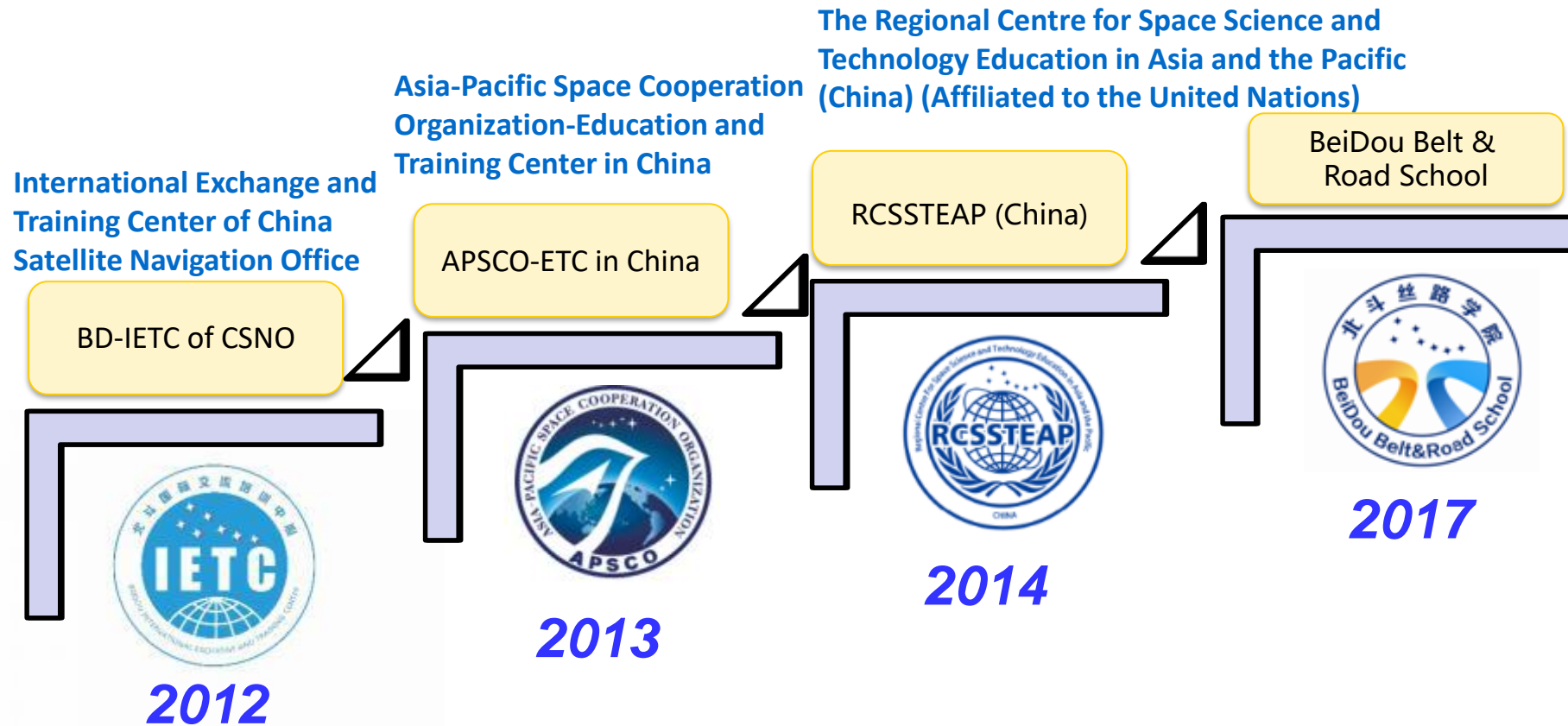
# *GNSS Education Capacity Building in China*

- Infrastructure construction*



# GNSS Education Capacity Building in China

- Educational environment**



**GNSS Education Platforms**

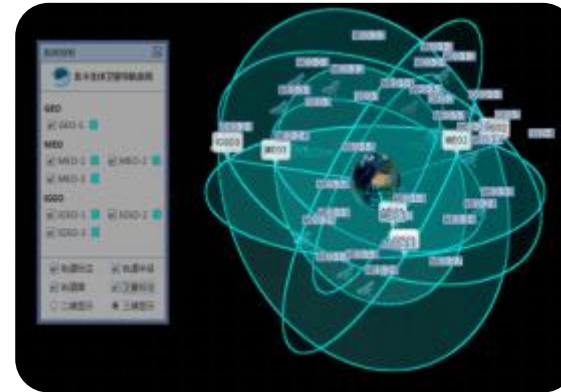
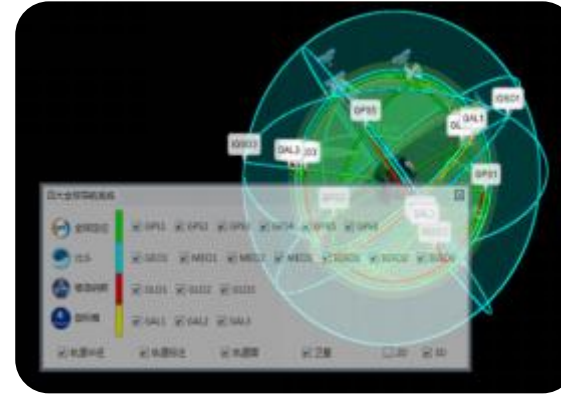
# *GNSS Education Capacity Building in China*



**BDS Exhibition Hall**



**Smart Classroom**



**Courseware/Tools**



**Experiment equipment**

## **Experimental teaching conditions**

# GNSS Education Capacity Building in China

- Experts/Lecturers
- Professional Visit
- Project



## Map of Partners

**CASC** China Great Wall Industry Corporation  
**中国航天**  
**China Academy of Space Technology**  
**China Centre for Resources Satellite Data and Application**  
**Shanghai Academy of Spaceflight Technology**  
**China Academy of Launch Vehicle Technology**  
**BeiDou Navigation Satellite System**  
**UniStrong 百益世纪** Beijing UniStrong Co., Ltd.  
**北斗星通** Beijing BDStar Navigation Co., Ltd.  
**ChinaCS 中科星图** ChinaCS Geoinformatics Co., Ltd.  
**COSIC** Beijing Aerospace TITAN Technology Co., Ltd.  
**21AT** Twenty First Century Aerospace Technology Co., Ltd.  
**APSCO**  
**NSRCC 北京国家空间中心**  
**UN-SPIDER Beijing Office**  
**HIJST** International Centre on Space Technology for Natural and Social Science (under the auspices of UNESCO)  
**NSSC 中国科学院国家空间科学中心 CAS** National Space Science Center  
**Space Debris Observation and Data Application Center China National Space Administration**  
**NSMC** National Satellite Meteorological Center  
**RADI** Institute of Remote Sensing and Digital Earth  
**NAOC** National Astronomical Observatories Chinese Academy of Sciences  
**NTS** National Time Service Center

• 中心以“开放、创新、包容”为理念，不断扩大合作，创新发展。  
 The Centre, sticking to the vision of "Openness, Innovation, and Inclusiveness", is continuously expanding cooperation with innovative development.

## Practical teaching base



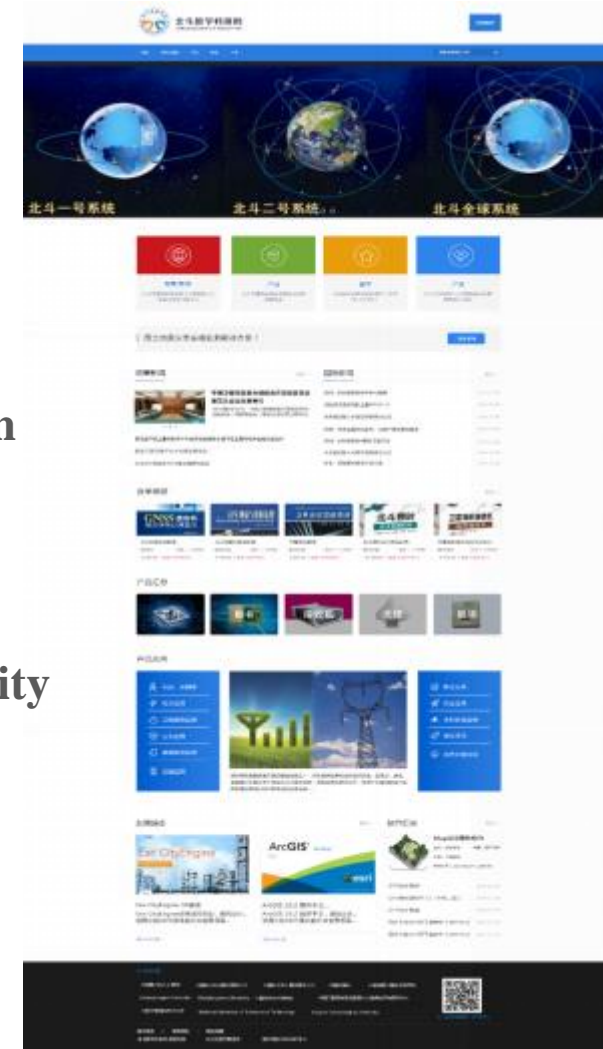
# GNSS Education Capacity Building in China

- *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

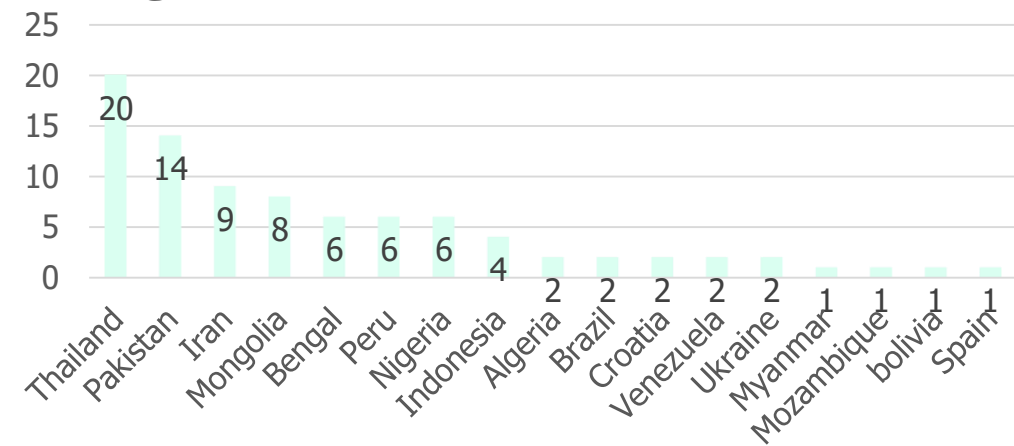
- Teaching activities**

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**



■ 2012-2018 Student Number

## 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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