



**BeiDou Belt and Road School (B2ROS)**  
**Beihang University**

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1. Introduction
  2. Architecture of B2ROS
  3. Academic education and training
  4. S&T cooperation and BDS localization
  5. Solid basis in Beihang University
  6. Summary

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# Wishes

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- Satisfy the needs of issues in countries along the Belt and Road
  - Popularization of BDS/GNSS services
  - Education and training of professional resources
  - Scholarship exchange
  - Joint R&D
  - Construction and application of infrastructure, esp. precise positioning
- Assistant to promotion of green growth from BDS/GNSS
  - Emerged new generation of location service to IOT
  - Enlarged scale of market with Internet economy
  - Applications to support smart governance of society
  - Location and trace of goods for global flow of things

# Ways and means

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- Collaborated with top universities in related countries along the Belt and road
  - Organize and manage the school jointly
  - Share perspective achievements of knowledge, curriculum, facilities
  - Exchange of teachers, students
  - Support training courses jointly
  - Cooperate on R&D of BDS/GNSS and its applications
- Focus on BDS/GNSS
  - Scholarship education to increase numbers of professional resources
  - Training and exhibitions to let more citizens know and use this technology
  - Joint R&D of integration with IOT, Big data, to provide service daily and reliable

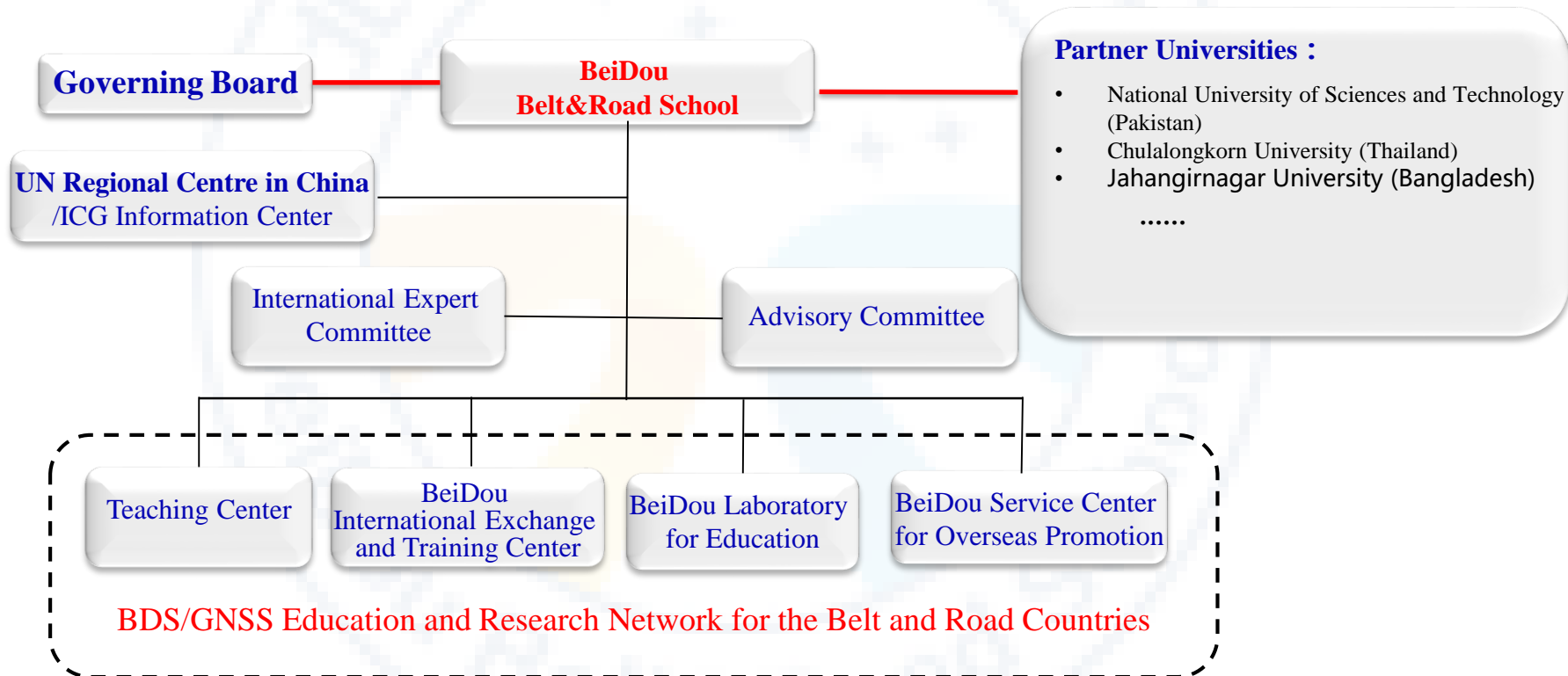
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# Office in HQ of Beihang Univ.

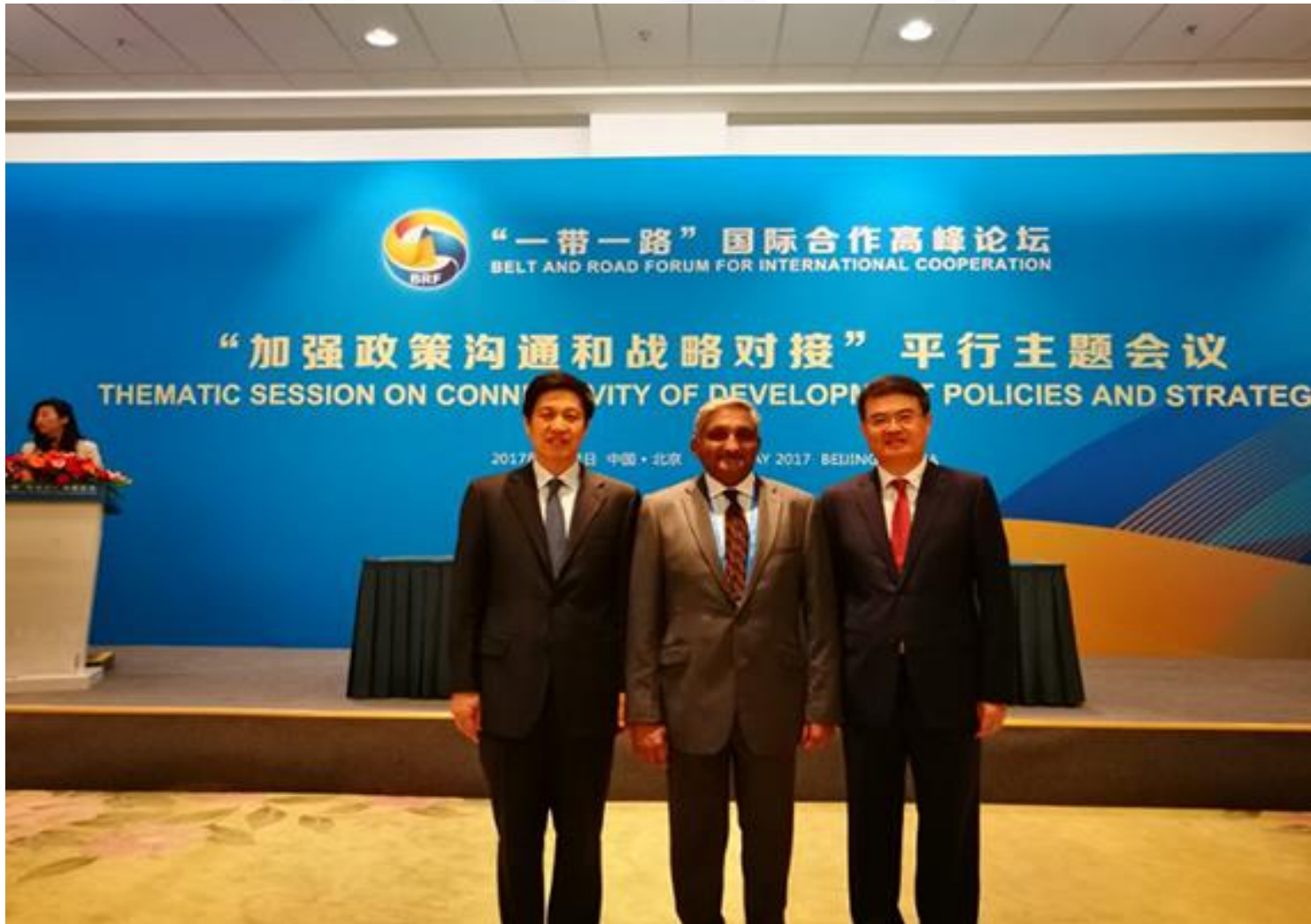


# Architecture of B2ROS

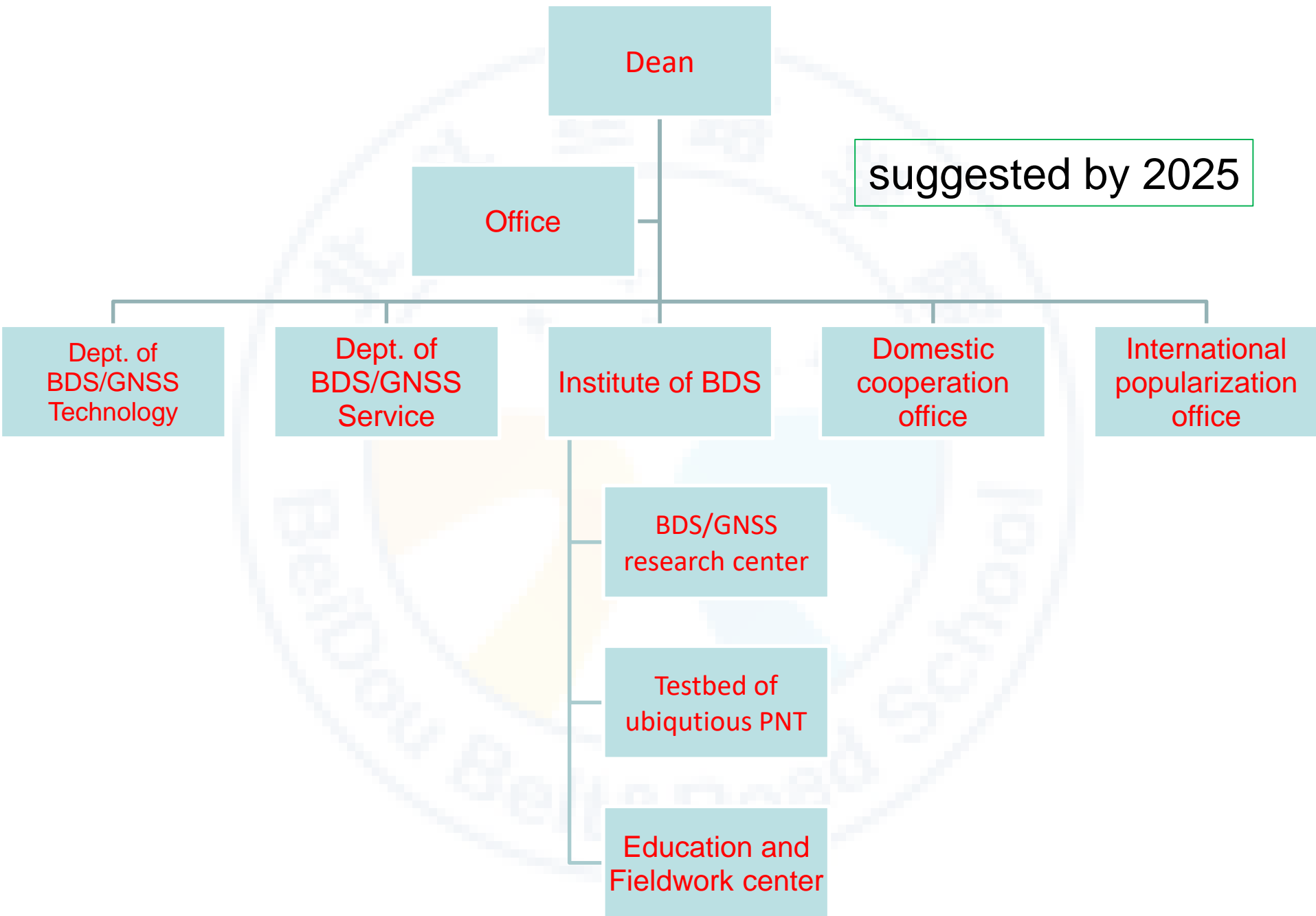




# NUST and Beihang Co-construction



Prof. Naweed Zaman, president of NUST, and prof. Huibin Xu, president of Beihang, Signed MOU in Beijing in May 2017



# BeiDou/GNSS Education and Research Network (NERN)

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- Initiated and started from Beihang University, join and access by every co-construction partner welcomed
- Vital facility for B2ROS, linkage of partners
- Contents includes education material and research tools
  - Textbooks, presentations, teaching and lecture videos, test papers
  - Software and data for fieldwork
  - Blueprint of NDS/GNSS development, market
  - Census of BDS/GNSS
  - Policy and consultant
  - Enterprises and products
- Each node of NERN is equal
- New participation will be supported, a local node at first time



Main campus of school located in Suzhou, Jiangsu Province, close to Taihu Lake

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# Scholarship education

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- **Distinguishing discipline system**
  - Belong to first-grade disciplines of Information and communication engineering, Control science and engineering (according to MOEC)
  - Establish new disciplines of GNSS, Celestial mechanics and satellite orbit, Combined navigation, LBS, Integrated PNT
- **Aim to BDS/GNSS development and applications**
  - Construction, operation and maintenance of constellation
  - Applications of BDS/GNSS includes interoperation
  - Promotion and governance of BDS/GNSS industry

# Scholarship education...

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- **Mechanism for international personnel**
  - English language for Textbooks, lectures
  - Mixed classes for international students and Chinese students
    - International and domestic students about 3:1
  - Bilateral recognition of scores, scholarship
  - Appointment of international scientists to give lectures, to be tutors
- **Strengthen practice of Innovation and Entrepreneurship**
  - Testbed of BDS/GNSS, GBAS, SBAS, LBS to understand relevant platforms
  - Joint lab with companies to test knowledge and BDS/GNSS products
  - Regular competition of Innovation and Entrepreneurship in Beihang University

# Scholarship education.....

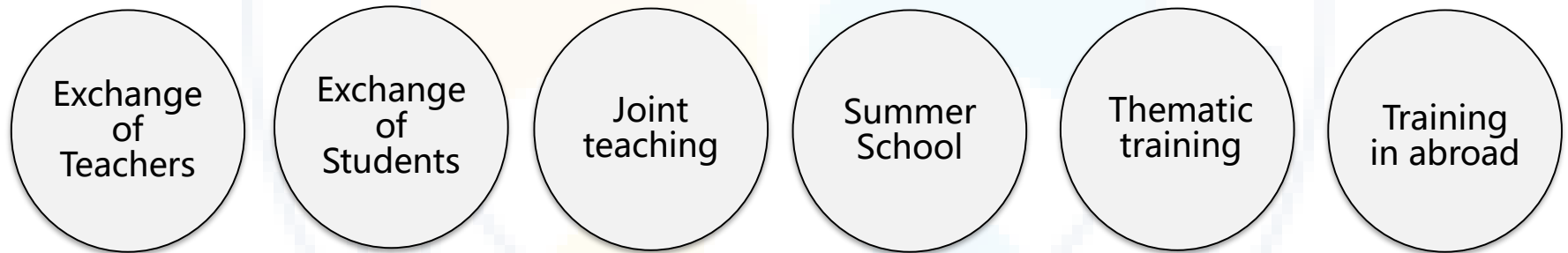
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- Enrollment of kinds of students from domestic and abroad
  - Graduate students for Master and Doctor degree start from 2018
  - Scale of students will reach 300 till 2022
  - Enrollment of undergraduate students will start by 2022
- Distance video education for remote area classes or abroad students
- Heighten and keep higher quality of graduate education
  - Adopt international evaluation standards
  - Fulfill two tutors mechanism gradually: one from China vs one from abroad
  - Enhance test weighty of Innovation capability



# New mechanism of education

International cooperation among co-construction partners besides normal academic education



# Training Courses

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- Important issues for B2ROS to implement frequently
- Support training courses in China and in abroad
- Network and database of global experts and companies to guarantee excellent training events
- Systematic training textbooks, test facilities, support material, normalized procedure
- Trainees database and revisit mechanism, support trainees work in BDS/GNSS afterwards and long-term

## Training courses in Thailand



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# Cooperation

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- Training of Human resources
- Technology support
- Based on CORS, support to construct processing center, operation center and operate by partner
- Manufacture of devices
- Establishment of application systems
- Joint venture between two sides if agreed

# Industry Chain of BDS

室内定位系统 四大卫星定位导航系统

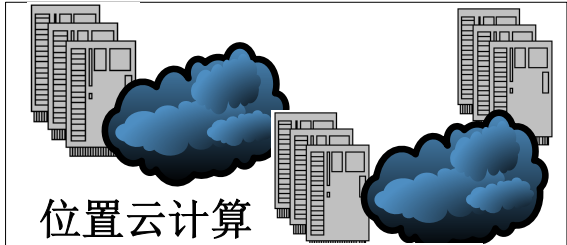


**BDS:**  
**Constellation**  
广域增强系统



**PNT1m Provider**

位置云计算



**Information Provider**




**Terminals**



移动  
社会  
网络

facebook  
twitter  
foursquare

**Service provider**

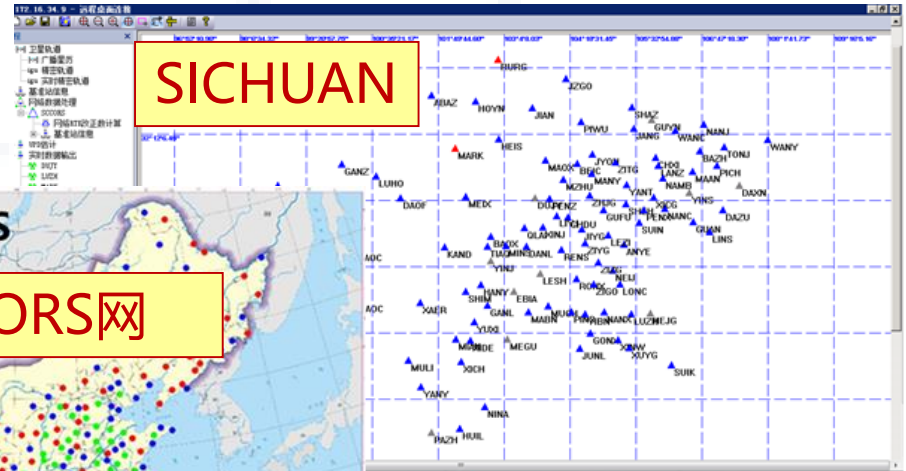
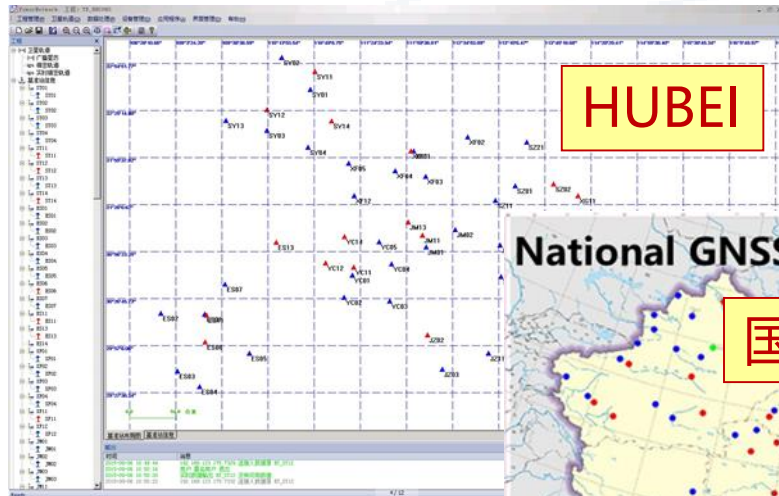


**eMap**

**Content provider**



# BDS Ground PPS in China



Courtesy Shi Chuang

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Crucial support and demand from:

# BeiDou Global Navigation Satellite System

BDS-3 is being constructed, will provide high-accuracy positioning, navigation and timing services to global users in all-time, all-weather conditions

**The 1st Step:**

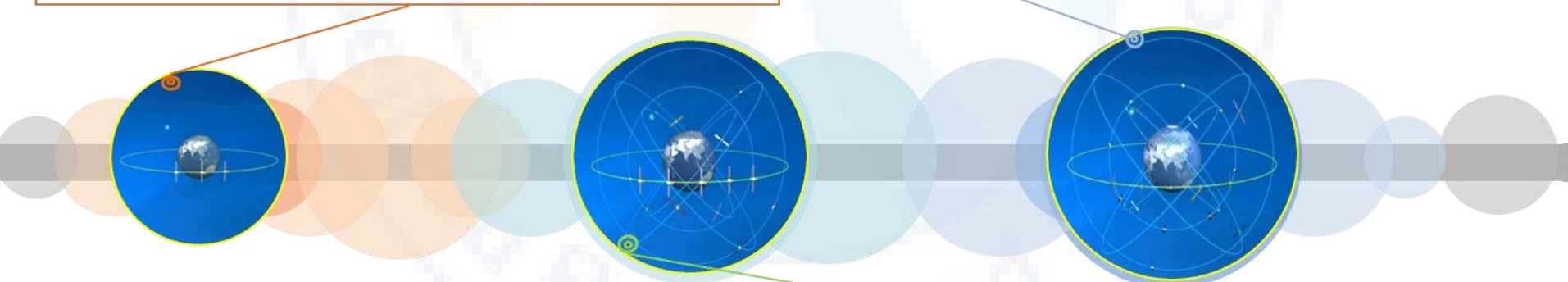
**1994 ~ 2000 , provide regional active services**

**The 3rd Step:**

**2013 ~ 2020, provide global passive services**

**The 2nd Step:**

**2004 ~ 2012, provide regional passive services**



# Beihang University is top university in aerospace and astronautics in China

No.	First level disciplines	Ranking ( 2012 )
1	<b>S&amp;T of Aerospace and Astronautics</b>	<b>1</b>
2	<b>S&amp;T of Instruments</b>	<b>1</b>
3	<b>Computer S&amp;T</b>	<b>4</b>
4	<b>Software engineering</b>	<b>4</b>
5	<b>Control Science and Engineering</b>	<b>4</b>





- BeiDou International Exchange and Training center (BDIETC) founded in Beihang University on 24 August 2012, approved by BeiDou Satellite Navigation Engineering Center
- BDIETC provided excellent base for B2ROS

# Training events in Beihang University

- BDIETC established a set of courses system for graduate students,
- BDIETC trained about 80 Degree scholarship persons for more 10 countries in Asia and Pacific region
  - Included 60 Masters and 18 Doctors
- BDIETC have held more than 14 short term training courses, favoured more than 600 trainees from more than 40 countries during past 4 years
- BDIETC have also been to 10 countries to open training courses for local trainees
- Adapted to the development of BDS-3, target of more than 150 trainees is being studied. School is needed to match this requirement

# Scholarship education

## Master degree

### Phase I 第一阶段

**Course Study in China: 9 months (in BUAA) 九个月的课程学习 (北航)**  
**(Leading to Course completion Certificate of BUAA) (获得课程结业证书)**

#### Module I

#### Module II

#### Module III

Common Platform Courses  
(all Directions)  
公共平台课程

- Major courses
  - Academic Lectures
  - Professional visits
- 专业课程  
讲座  
专业参观

- Pilot Project  
实践课程

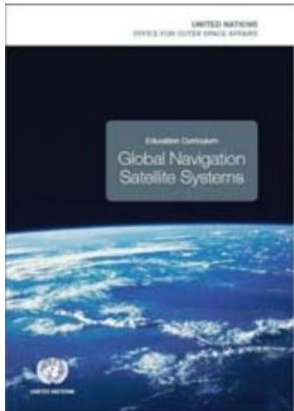
### Phase II 第二阶段

**Thesis Research: 12 month (in China or home country) 论文研究 12个月 (中国或学员本国)**  
**(Leading to Master' s Degree in Engineering) (获得工学硕士学位)**

# Scholarship Education

## GNSS courses

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



# Textbooks of BDS/GNSS



GNSS Master degree



GNSS training courses

# Facilities for education and training



BeiDou Satellite Navigation System  
Exhibition Hall ( Located at Beihang  
Aerospace Museum)



GNSS Smart Classroom



Experiment equipment



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# Summary

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- B2ROS focus on scholarship education, training, R&D for awareness and applications of BDS in the world esp. along the Belt and Road
- B2ROS have good facilities to succeed education and training target, and heighten itself together with construction and applications of BDS-3
- B2ROS are willing to collaborate with international partners to implement education, training, R&D, applications in domestic and abroad
- Support and co-construct Beidou Belt and Road School with Beihang University are appreciated

# Thanks for your attention !

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