



Scientific and Technological Innovation of SJTU

Prof. Li Weidong
Vice Dean of Research Management Division



上海交通大学
SHANGHAI JIAO TONG UNIVERSITY

1

**Scientific and Technological
Innovation**

2

The Belt and Road Cooperation

1 Scientific and Technological Innovation

1 Scientific and Technological Innovation

1

Overall Status of Science Research

2

Disciplinary Platform Construction

3

Examples of Advantage Fields

4

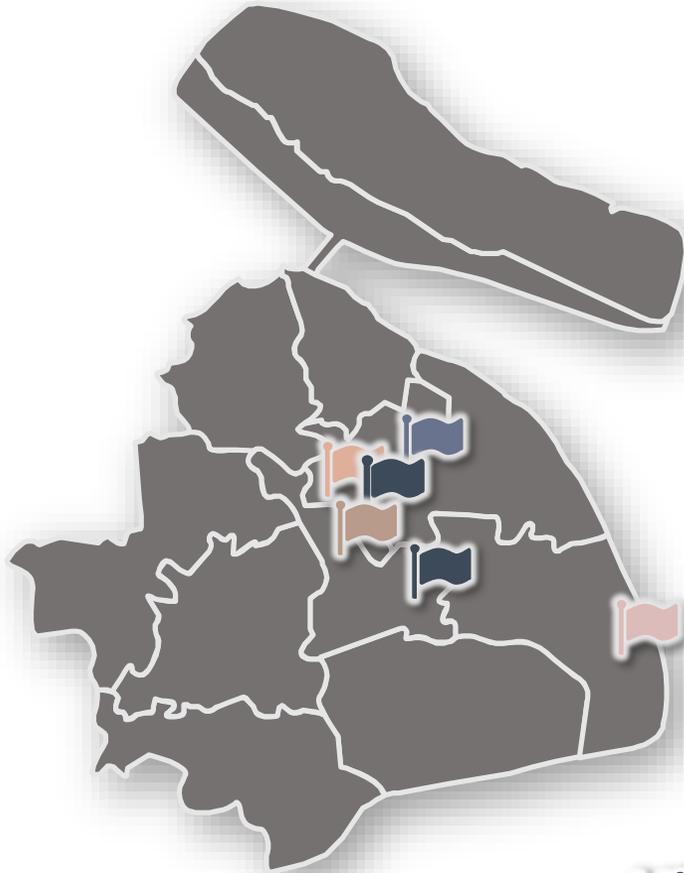
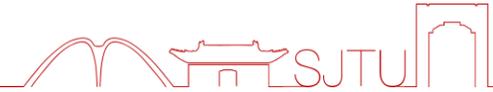
Technological Innovation System





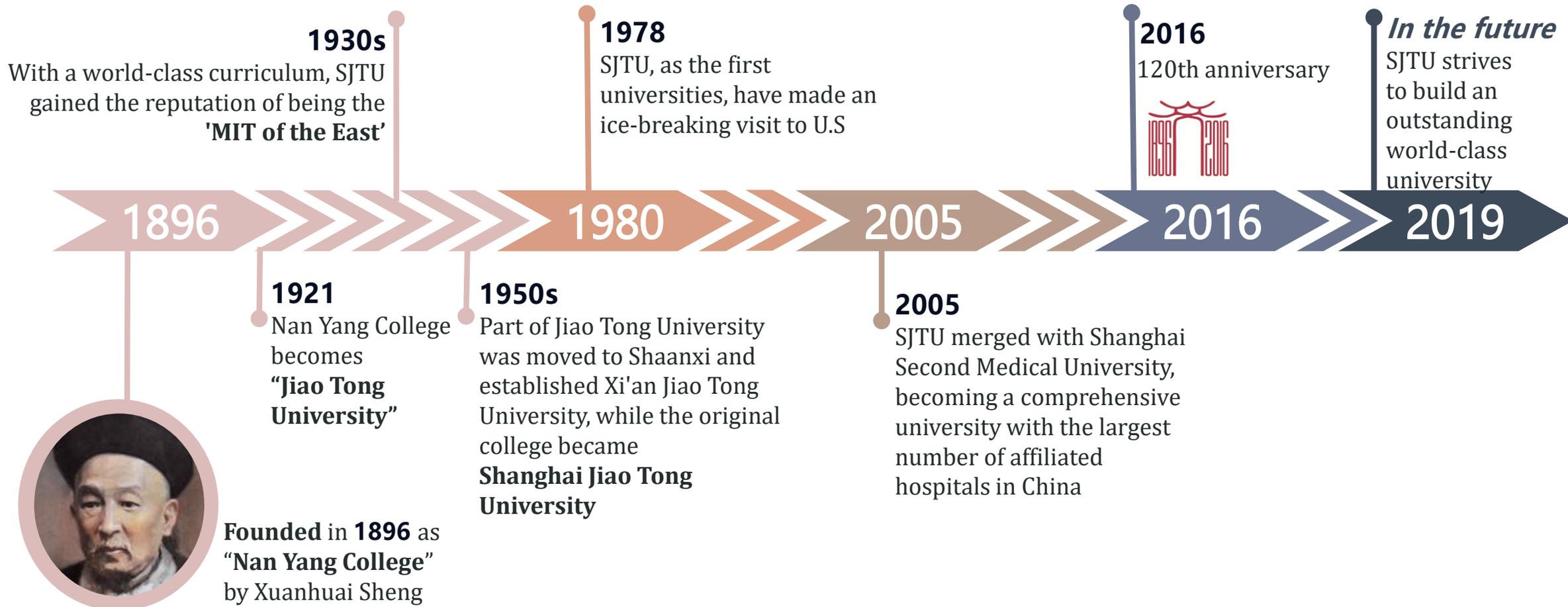
6

Campuses in Shanghai

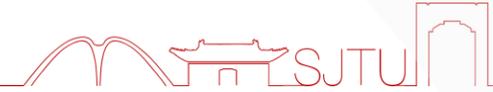


- Xuhui**: A large, ornate, classical-style building with a central portico and columns.
- Changning**: A modern, multi-story building with a prominent glass facade and orange accents.
- Qibao**: A modern building with a large, arched entrance and a landscaped courtyard.
- Huangpu**: A large, multi-story building with a red brick facade and a central courtyard.
- Pudong**: A modern, multi-story building with a glass facade and a landscaped courtyard.
- Minhang (830 acres)**: A large, multi-story building with a red brick facade and a central courtyard, surrounded by a large green lawn.

History



Notable Accomplishments



Invented a Chinese-character typewriter



Rescued a patient with extensive burns



Successfully performed a cardiac mitral valve separation surgery



Built a space rocket



Built a 10,000-ton ship

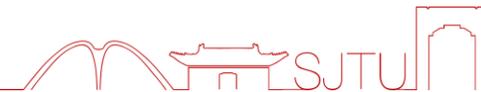


Built an automobile



First in China
to have

Rankings



#59



#101-150



#145



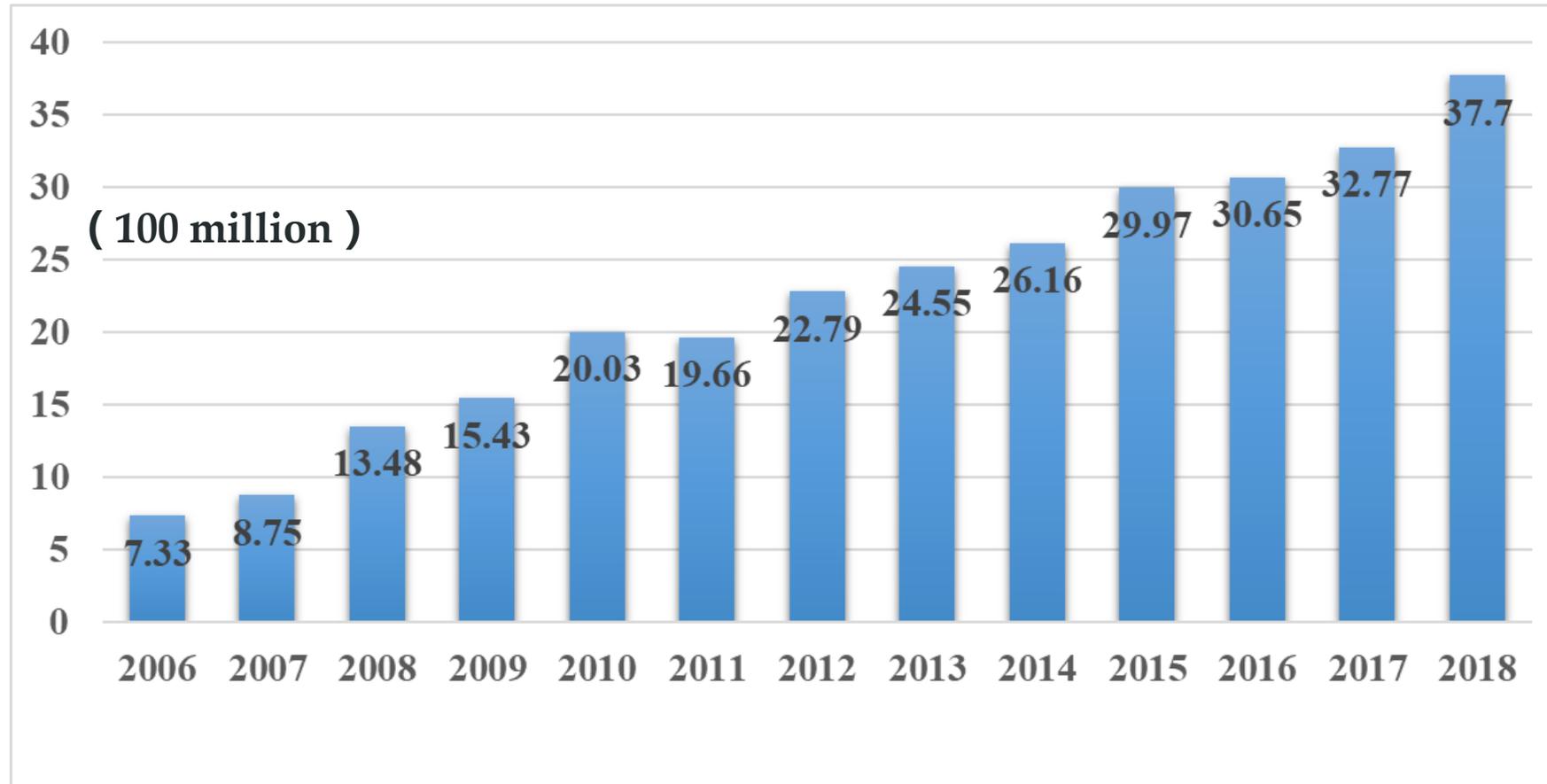
#189



上海交通大学

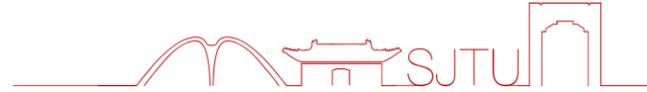
SHANGHAI JIAO TONG UNIVERSITY

Scientific Research Funding is Steadily Growing

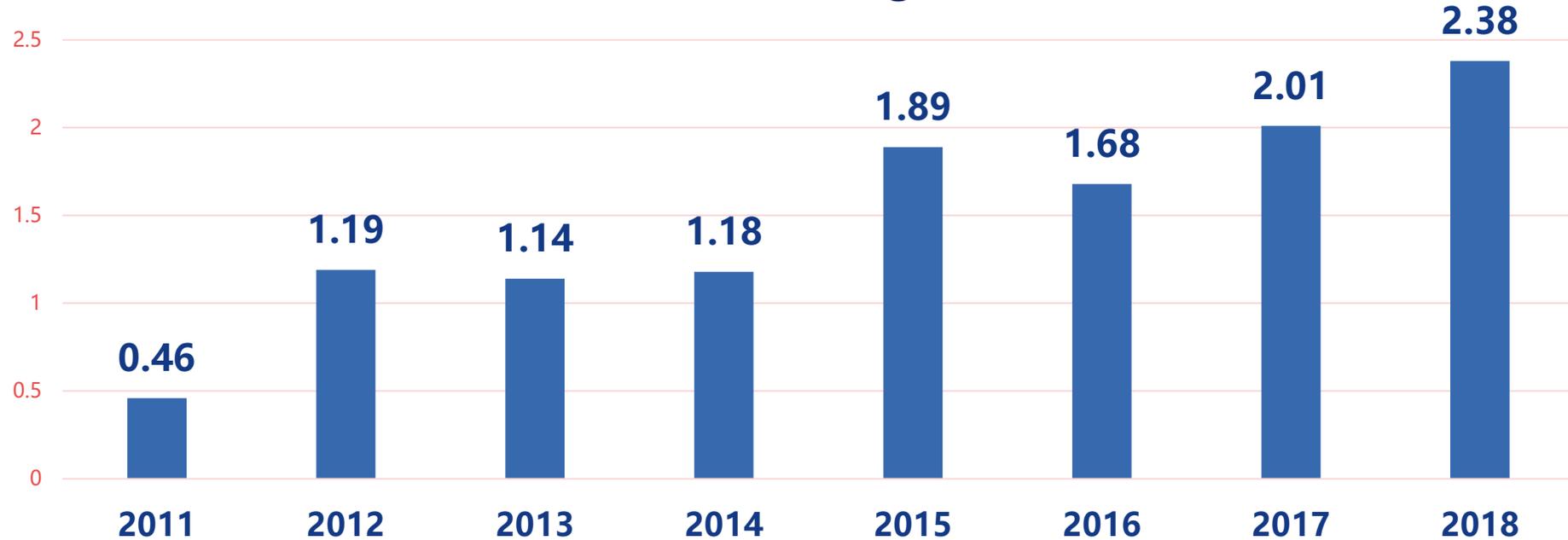


- In 2018, the financial revenue of the Univ. was 12.8 billion yuan, and the proportion of research funds exceeded 1/4.

International Scientific Research Cooperation

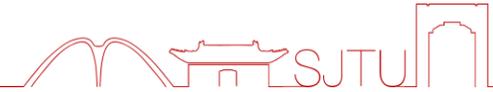


Contract Funding (100 million)



- The initial improvement of research capacity and influence of international frontier research
- Gradually form an international scientific research cooperation pattern of government, industry, academia and research

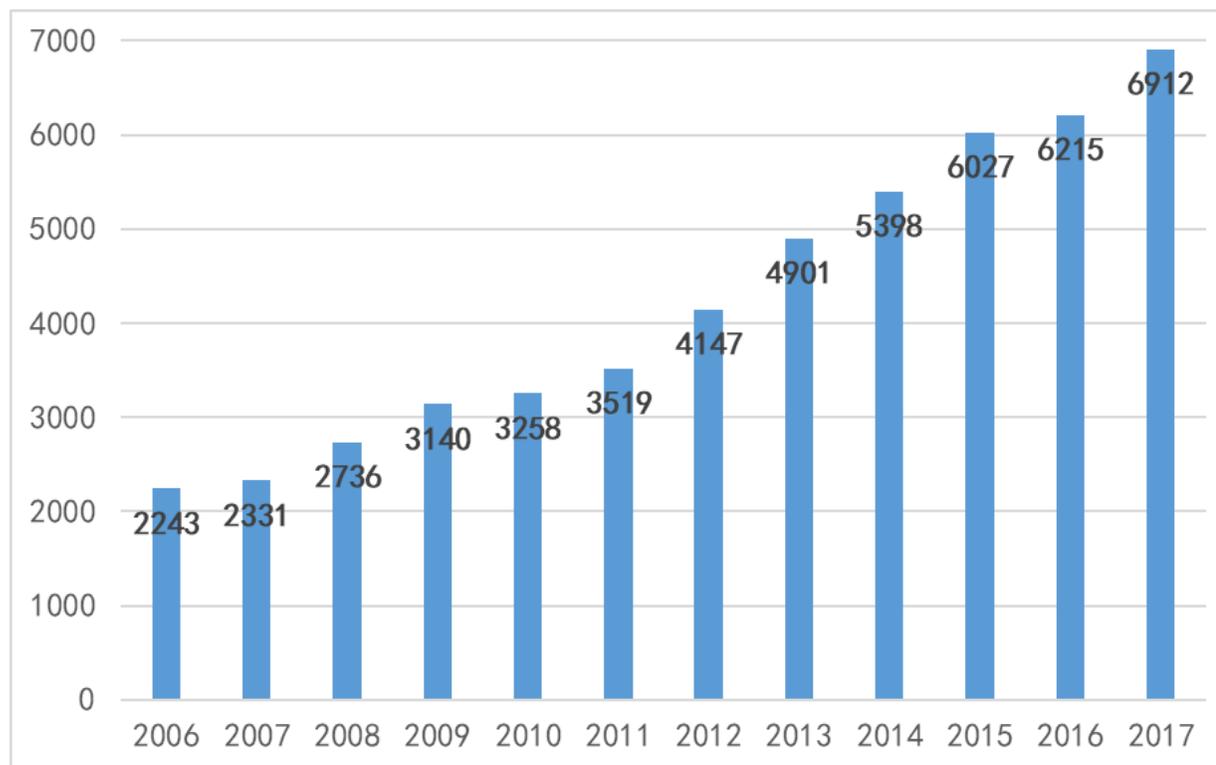
Fundamental Research: from Quantity to Quality



National Science
Funding
Remain First



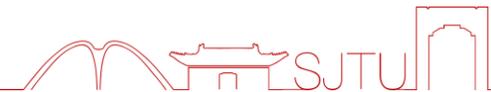
Number of SCI papers continues to grow



Number of SCI papers grows rapidly, and academic activity continued to improve. In 2015, the total number of papers and “excellent performance” papers ranked first in national universities.



Achievements in discipline construction

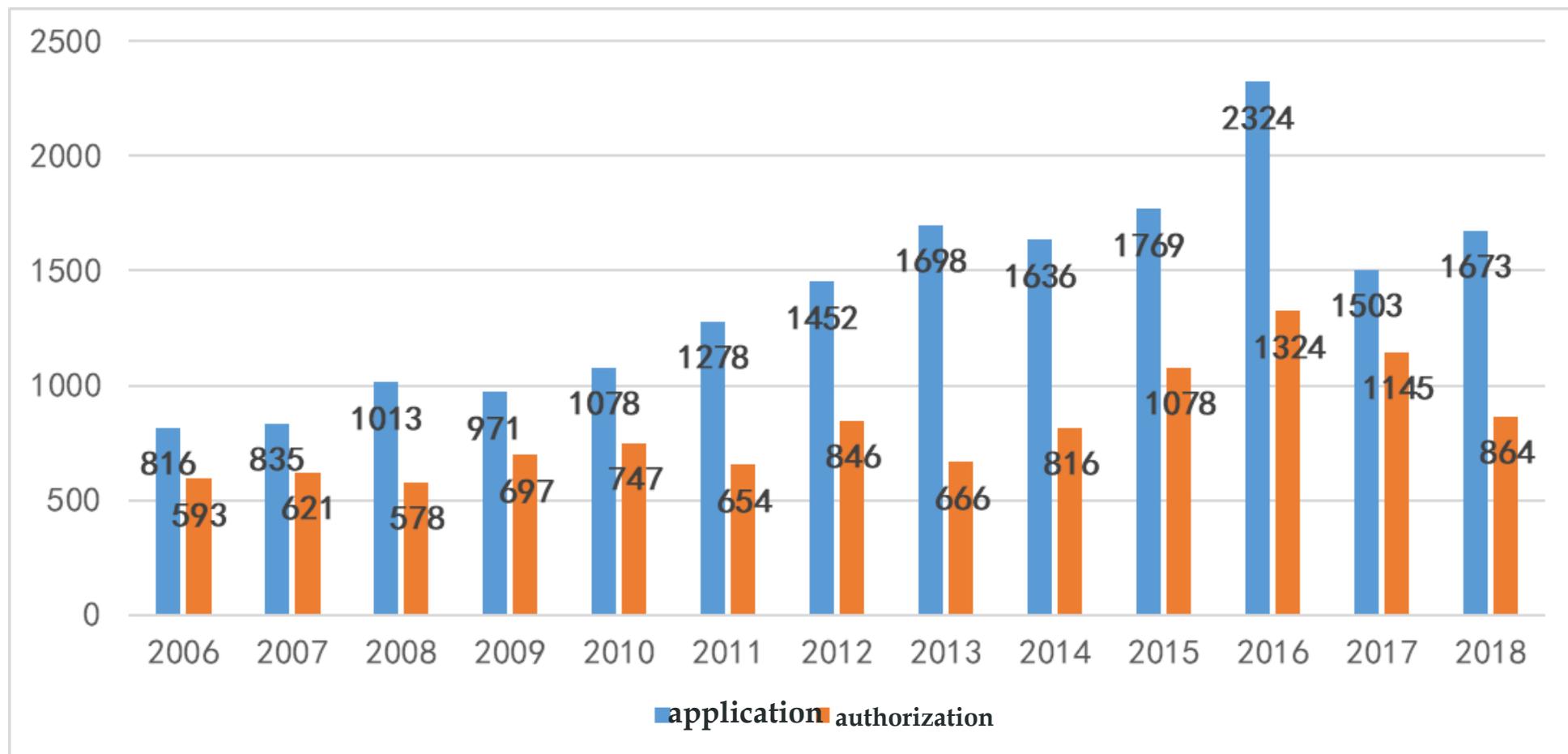


Comprehensive ranking of ESI 100 univ. in China (2018.11-2019.09)

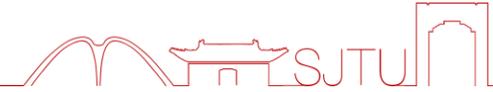
No.	Name	2019.09	2019.07	2019.05	2019.03	2019.01	2018.11	Progressive position	Trend map
1	Univ. of Chinese Academy of Sciences	82	86	85	88	88	90	8	
2	Peking Univ.	88	89	89	89	89	91	3	
3	Tsinghua Univ.	92	93	94	94	99	101	9	
4	Zhejiang Univ.	104	104	104	107	109	111	7	
5	Shanghai Jiao Tong Univ.	105	107	107	116	117	120	15	
6	Fudan Univ.	155	156	154	160	160	161	6	

•A number of disciplines are close to the world class, and are close to the world's top 100, ranking prominently in the ESI rankings.

Number of patent applications and authorizations steadily increase



Technological innovation progress



Year	2016	2017	2018
National	Second prize: 4	Second prize: 5	Second prize: 10
Shanghai	First prize: 12	First prize: 13	First prize: 30
Ministry of Education	First prize: 12	First prize: 10	First prize: 10
Industry	First prize: 4	First prize: 7	First prize: 13

30 first prizes in Shanghai, the total number and first prizes **ranked first, the best record in history**

First prize of National Defense Science and Technology for **the first time** and the first prize of the Army Science and Technology Progress Award

Organized to declare 32 awards from the Ministry of Education, and won the first prize and the total number of prizes rank **the second place among all universities.**

1 Scientific and Technological Innovation

1

Overall Status of Science Research

2

Disciplinary Platform Construction

3

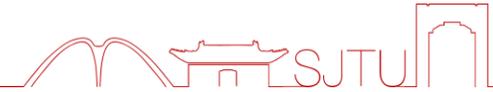
Examples of Advantage Fields

4

Technological Innovation System



Provincial and above research bases (112)



- National Major Infrastructure 1
- State Key Laboratory 8
- National Engineering Research Center 5
- National R&D Center 1
- National Collaborative Innovation Center 3
- National Engineering Laboratory 2
- Key Laboratory of the Ministry of Education 17
- Ministry of Health, Ministry of Agriculture and other key laboratories 6
- Shanghai Key Laboratory 36
- Excellent evaluation of the State Key Laboratory of Mechanical Systems and Vibration
- Outstanding performance evaluation of the “Shanghai Top Ten Projects” of the medical school
- Our new rural development research institute has been approved to upgrade to the national level
- In 2012, we are selected as the “Promoting Plan” innovative talent training demonstration base of the Ministry of Science and Technology.



» State Key Laboratories (8)

- Ocean Engineering
- Mechanical Systems and Vibration
- Metal Matrix Composites
- Local Fiber-Optical Communication Networks & Adv. Optical Communication Systems
- Oncogenes and Related Genes
- Medical Genomics
- Microbial Metabolism
- Micro/Nano machining technology

» National Engineering Laboratories (2)

- Automotive Electronic Control Technology
- Information Content Analysis Technology

» National Engineering Research Centers (5)

- Die and Mold CAD
- Light Alloy Net Forming
- Nanotechnology and Its Application
- Tissue Engineering
- HDTV

» National S&T Infrastructure

- Translational Medicine (Shanghai)

Advanced ship and deep-sea engineering



Hopper dredger



Deep-sea drilling platform
(offshore oil 981)



Sea-dragon
(Hailong)



Seahorse (Haima)

National Infrastructure for Translational Medicine



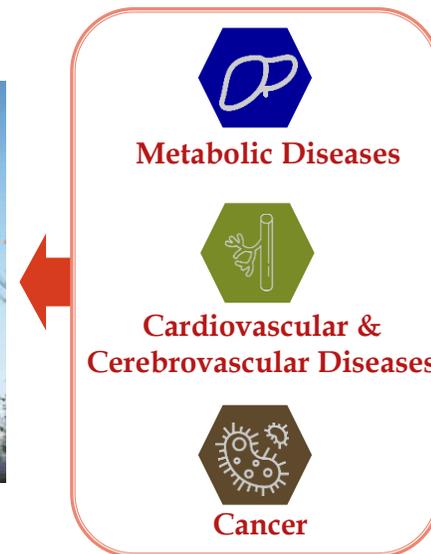
Employ technological development to support clinical research



The Minhang Building (60,000m²)



The Ruijin Building (54,000m²)



Metabolic Diseases

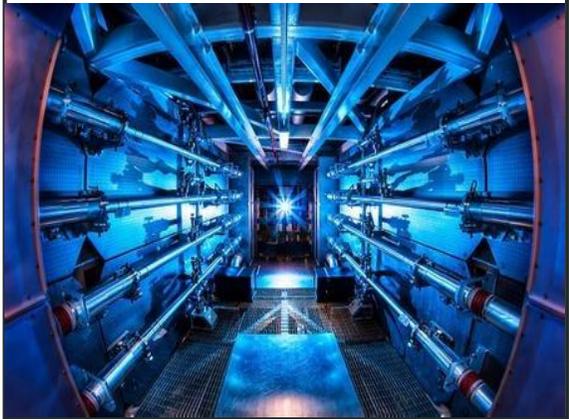
Cardiovascular &
Cerebrovascular Diseases

Cancer

Recognized by three 2011 Collaborative Innovation Centers



**IFSA Collaborative
Innovation Center**



**High-tech ship & deep-
sea develop equipment
Collaborative Innovation
Center**



**Future media network
Collaborative Innovation
Center**



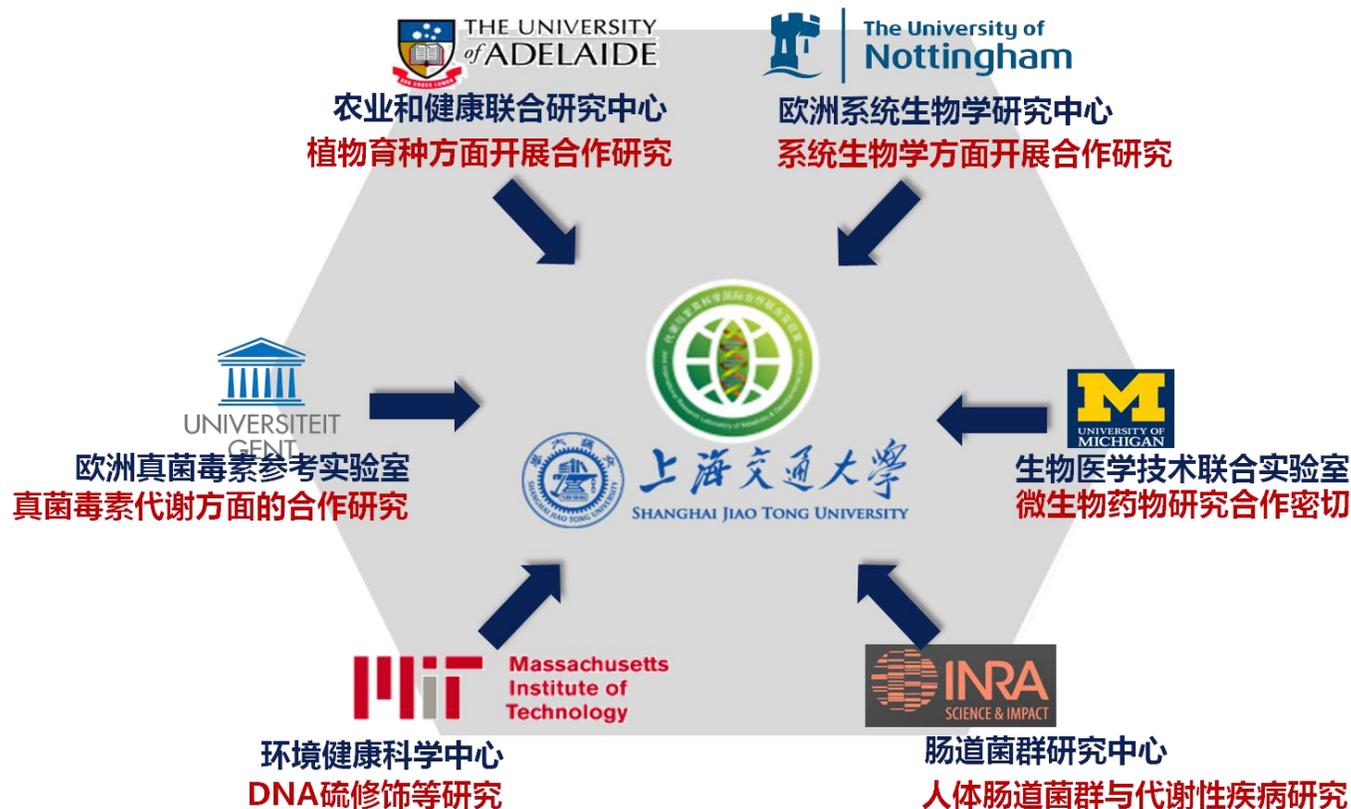
38 collaborative innovation centers have been identified, and SJTU is the only university to be recognized by 3 collaborative innovation centers.

The System Biomedical Collaborative Innovation Center is included in the Shanghai 2011 Action Plan, and strives to obtain the national approval in the next batch.

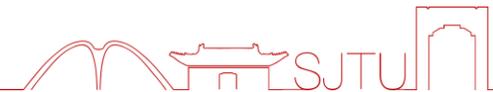
International joint laboratory model



Forming the 1+6 International Consortium through years of cooperation
"Joint Laboratory for International Cooperation in Metabolism and Developmental Science" was established through the establishment of the Ministry of Education



Research Overseas Presence (Singapore)



Energy and Environmental Sustainability Solutions for Megacities Workshop (E2S2)



Singapore

*Joint NUS-Government
Agencies Collaboration*

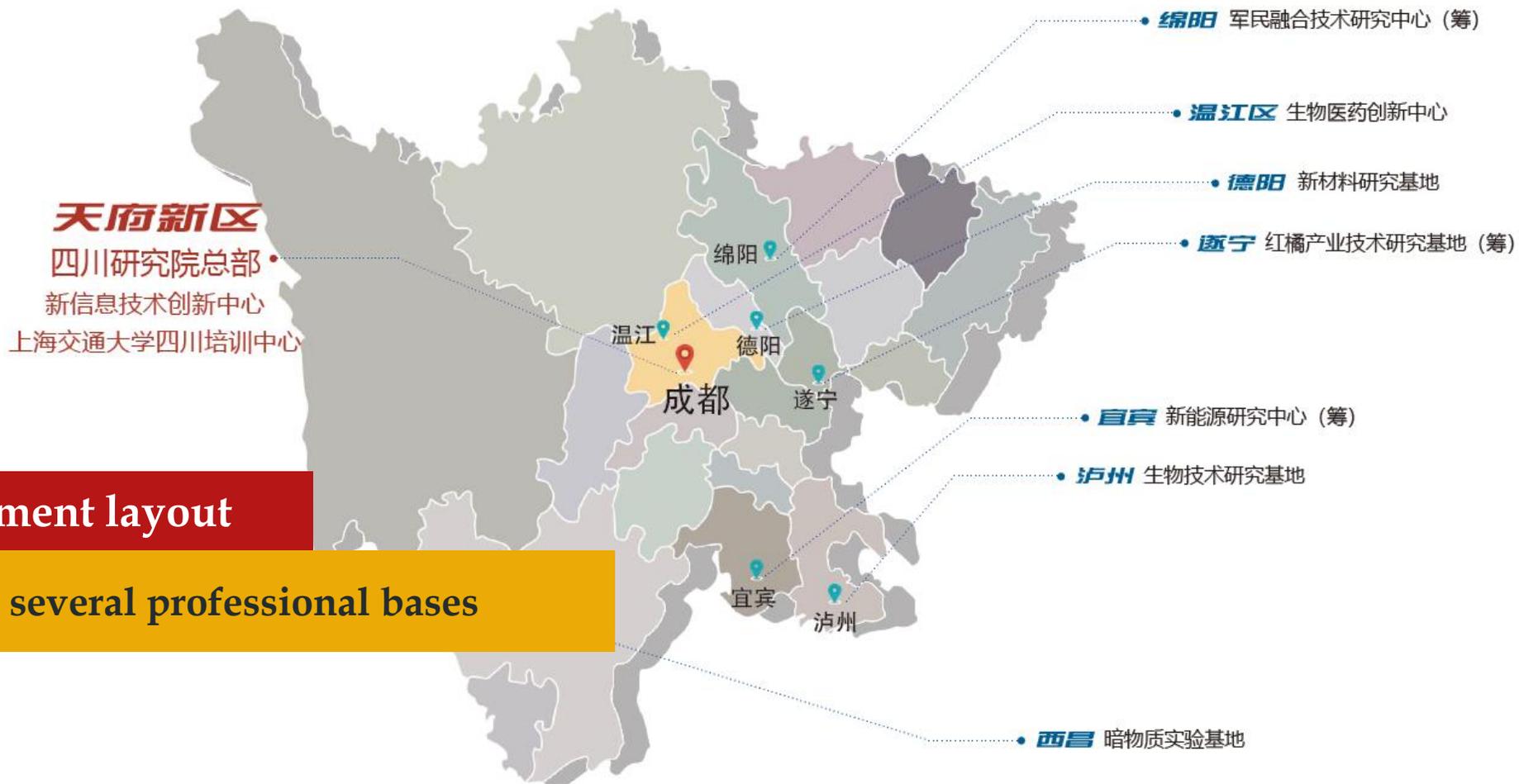


Shanghai, China

*Joint SJTU-Government
Agencies Collaboration*



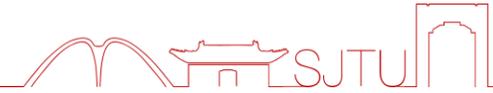
*Developing a platform to solve common problems
in cities of increasing size and complexity*



"1+X" development layout

1 headquarter, several professional bases

Yunnan Dali Research Institute of SJTU



The institute is based in Dali, serving Yunnan province, and directly responding to local development needs of South Asia and Southeast Asia: technology development, technology transfer, talent training, industrial management, and introduction of projects (including founding companies).

- “11th Five-Year” national-level Project – Erhai Lake Project
- Founded: Deng Zixin Academician Workstation, Bruce Michel Academician Workstation, He Dequan Academician Workstation



1 Scientific and Technological Innovation

1

Overall Status of Science Research

2

Disciplinary Platform Construction

3

Examples of Advantage Fields

4

Technological Innovation System



» High-Definition TV (HDTV) technology



Zhang Wenjun



» Laser Manufacturing



» Smart Manufacturing Center



SJTU—Fraunhofer

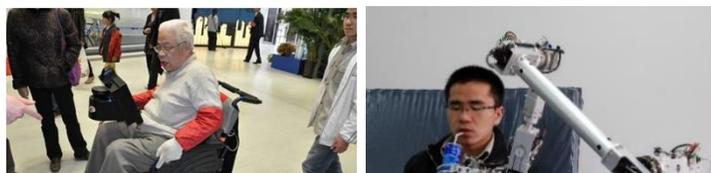


Shanghai Jiao Tong University (SJTU)



Fraunhofer Institute for Manufacturing Engineering and Automation (IPA)

Speech, Image and Robotics



Smart wheelchair

Assistive robot



Soft robot for minimally invasive surgery



Research topics

- Intelligent Speech Technology : End-to-end non-cooperative speech and language interaction
- Intelligent Processing of Big Data
- Computer Graphics and Image Processing
- Service Robotics
- AI Applications in Smart City, Social Networks and Finance

Face Recognition

- Research has twice broken world records in cooperation with Tencent

Transfer of the R & D

- AISpeech – SJTU Joint Lab
- 2016 Goldman Sachs: Key AI Players
- 2017 Gartner “Cool Vendors for AI ”(East Asia)





» National Award Winner for Science and Technology Development

: Improvement in survival rate of patients with promyelocytic leukemia



Wang Zhenyi



Chen Zhu



Chen Saijuan

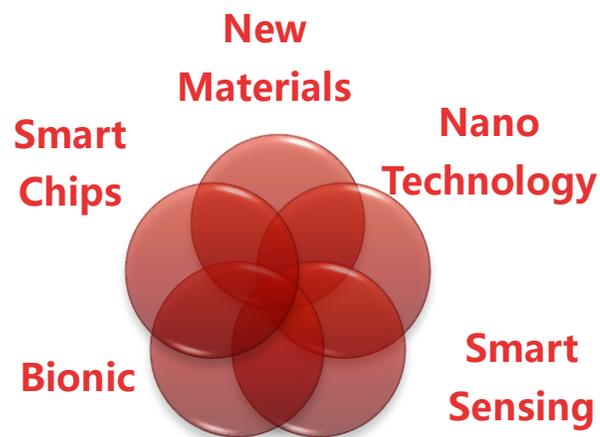


Chen Guoqiang

Clinical

Laboratories & Public Platform

Industry



■ Intercollegiate and industry collaboration, sharing of scientific infrastructure.

■ Sharing scientific infrastructure and open to intercollegiate collaboration team and industry.

■ Establishment of a complete medical robotic ecosystem and industry chain.



**Commercial Aircraft Corporation
of China Ltd (Shanghai)**

- Joint research centers : aircraft design, manufacturing and customer service
- COMAC collaborated with SJTU to launch a professional training class for COMAC employees, established scholarships in SJTU, and listed SJTU as one of the key universities for graduate recruitment

1 Scientific and Technological Innovation

1

Overall Status of Science Research

2

Disciplinary Platform Construction

3

Examples of Advantage Fields

4

Technological Innovation System



Cross-platform Innovation Layout



Translational Medicine

Tsung-Dao Lee Institute

Deep Sea Science and Engineering

Natural Research, Systems Biology, New Countryside Development

Zhangjiang “Three Centers and Two Platforms” (Complicated System 4D High Time and Space Resolution Detection Device)

Artificial Intelligence Institute

Shanghai Institute of Smart Manufacturing

Hydrogen Science Center

Intelligent Electric Vehicle

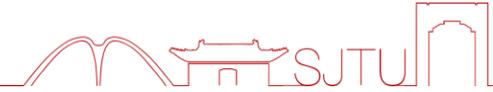
In-situ Science

Unmanned system

Brain Science and Brain-Like Intelligence

Urban environmental comprehensive management

Take the Initiative to Actively Explore International Research Cooperation



Advance Recommendations of the International Science Program

- Metabolic Science - Deng Zixin
- International Microbiological Group Program - Zhao Liping
- Design Science - Xie Youbai
- Ground semi-physical simulation system for space collision process - Gao Feng
- Gene Polymorphism of CYP450 Enzyme and Personalized Drug Development - Wei Dongqing
- Deep large field of view spectrum survey - Jing Yipeng
- Mental health - He Lin
- Second Home Biosphere Program - Wu Xiangping

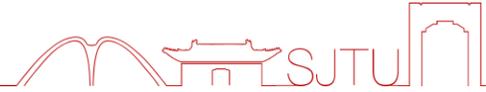
Focus on Fostering Several Joint Laboratories

- Joint Laboratory of Particle Astrophysics and Cosmology
- Joint Laboratory of Advanced Manufacturing Technology for New Energy and Energy Saving Vehicles
- Joint oncology laboratory
- Sino-US Joint Engineering Laboratory on Ocean Engineering
- Light Metal and Composites Joint Laboratory
- Sino-French Joint Laboratory of Ruijin Hospital

Advance and lead the national science plan, docking the Belt and Road Initiative, strategic development opportunities



Major scientific equipment/fundamental equipment



12th

“Five-Year Plan”

**Translational
Medical Research
Facilities**

13th

**“Five-Year
Plan”**

**Hard X-ray free
electron laser device**

**Joint application with Shanghai
Institute of Applied Physics**

**Extremely deep underground
radiation background front
physical experiment facility**

Joint declaration with Tsinghua Univ.

14th

**“Five-Year
Plan”**

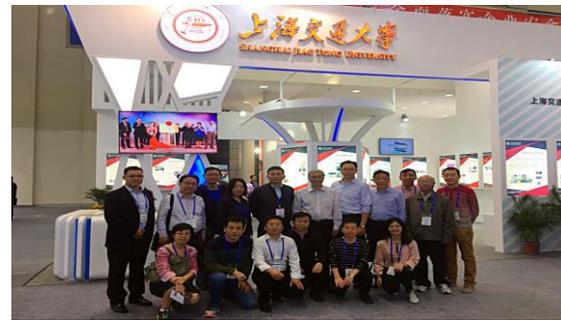
**High-resolution full-energy
spectrum electronic
detection complex**

**Ultrafast Science Center is preparing
It is expected to be included in the
National 14th Five-Year Plan for Major
Science and Technology Infrastructure**

In 2012-2030, China has built 7 scientific fields and 16 major scientific devices (energy, life, earth system and environment, materials, particle physics and nuclear physics, space and astronomy, engineering technology).



Enhance the Vitality and Influence of SJTU's Scientific and Technological Innovation



- CIIF, Civil-military integration and other large-scale exhibitions, holding subversive competitions, setting up "Yuan Chuang Forum", the first National Science and Technology Week and other activities...
- The series of activities have effectively enhanced SJTU's research docking ability, academic vitality and influence.

Serve Economic Development and Social Needs

Deepen the Strategic University-Enterprises Cooperation



Key Industry and Enterprise

Promote comprehensive strategic cooperation	Aviation	COMAC, AECC CAE, Civil Aviation Administration of China
	Aerospace	CASC, CASIC
	Ocean Engineering	CSIC (701、 702、 719) ; CSSC
	Nuclear Energy	CNNC (CNPE、 Ocean Nuclear、 NPIC) 、 CAEP、 SPIC
	Information Medical	HUAWEI、 Shanghai International Port Group、 SAIC MOTOR、 United Imaging
In-depth joint public relations	Marine Nuclear Power Platform	Ocean Nuclear
	Joint Research Center of Advanced Aerospace Technology	Advanced manufacturing, materials, information, spacecraft
	AECC CAE UIC	Superalloy, impeller machinery, low emission combustion, aluminum-based composite materials, intelligent manufacturing workshop

Clarify enterprise's demand orientation, jointly establish a platform, integrate talent teams, and jointly train students

Strengthen the informationization of scientific research management and support the construction of "double first-class"



Supporting "double first class" construction

Academic Achievement Ecosystem

Research Performance Analysis System

Subject Construction Support System

Functional Data Application

Academic Frontier

Achievement Display

Promotion of Achievements

Scientific Research

Achievement Reward

Research Evaluation

Subject Evaluation

Resource Allocation

Optimize Layout

Recruiting

Assessment

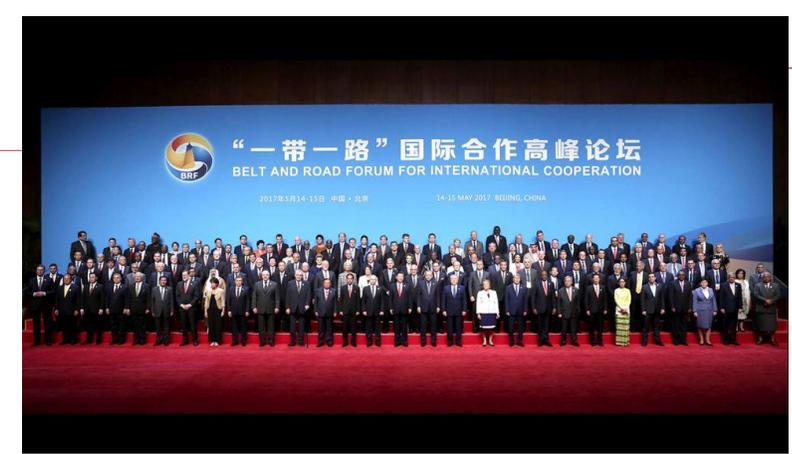
Cloud Computing Cloud Management

Scientific Data Center



2 The Belt and Road Cooperation

❖ The over 2,000-year history of exchanges demonstrates that on the basis of **solidarity, mutual trust, equality, inclusiveness, mutual learning and win-win cooperation**, countries of different races, beliefs and cultural backgrounds are fully capable of **sharing peace and development**. ❖



Sep. 7th, 2013

President Xi Jinping put forward the idea of the “Silk Road Economic Belt” for the first time in Kazakh. “Silk Road Economic Belt” is a big start for the establishment of “the Belt and Road”.

May, 2017

The “Belt and Road” International Cooperation Summit Forum was held in Beijing.

- Forum has “five focuses”, including infrastructure, economy and trade, industrial investment, energy, finance, culture, ecology and maritime cooperation. President Xi Jinping delivered important speech during the forum.
- Forum started the “Belt and Road” Science and Innovation Action Plan

Background

Under the circumstance of promoting cooperative exchanges and peaceful development through the “Belt and Road” in China, in the process to establish a globally influential center of scientific innovation in Shanghai, in order to consolidate the supportive and leading of scientific innovation in the “Belt and Road” construction, in order to promote Shanghai’s role as a bridgehead for scientific innovation along the Belt and Road, **Shanghai Jiao Tong University, in October, 2016, hereby initiate the establishment of “Belt and Road” Science and Innovation Network.**



Official Launch of the Belt and Road Science and Innovation Network

October, 2016



The “Belt and Road” Science and Innovation Network



Significance

Description

Initiated together and voluntarily formed by members of **colleges and universities, research institutes, and enterprises** along the Belt and Road, gathered in legal organization as an international nonprofit organization to promote scientific and innovation development.

Mission

With the purpose of promoting scientific innovation and cooperation along the “Belt and Road”, to serve the innovation development needs of countries and regions along the Belt and Road, and to promote the integration of scientific and technological innovation along the Belt and Road.

Give full play to popular science and technology exchanges, integrate and implement the “Belt & Road” technical resources, achieve mutual benefits in the fields of science and technology, and work together to create win-win situations.

Vision

Based on Shanghai, radiating out to the Yangtze Delta and to all of China, uniting the nations along the Belt and Road. Dream to be a bridge **for political, economic, and social cooperation** on scientific innovation and economic development within the “Belt and Road” community.



1. Scientific and cultural exchanges

- ✓ **Cooperate with B&R countries to train scientific and technological personnel, invite young scientists to China to engage in short-term scientific research work;**
- ✓ **Carry out a wide variety of training in advanced applicable technologies, scientific management and policymaking, technology assessment and entrepreneurship, etc.;**
- ✓ **Cooperate on a range of popular science events, host science and technology competitions;**
- ✓ **Strengthen communications on science and technology policy, support science and technology policy capacity building in countries along the Belt & Road;**
- ✓ **Regularly hold seminars in various fields under the framework of network, create a diversified platform for cooperation in scientific and technological innovation.**

2. Construction of joint laboratories

Combined with the major scientific and technological needs of Belt and Road countries, universities, research institutes and enterprise members in network are encouraged to establish joint laboratories (joint research centers) in key focus areas with relative organizations along the road.

3. Cooperation in Science and Technology Parks

Give full play to the scientific resources in network, construct distinctive and attractive science and technology parks, achieve mutually complementary advantages and common development.

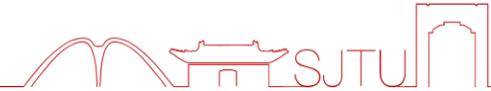
4. Technology transfer

Bring universities, research institutions, and enterprises across the Belt and Road together to refine existing basic technology or experience; build a range of technology transfer centers together, further perfect the technology transfer collaborating networks and information interlink platform construction; strengthen the combination between resources such as technology, talents, information and the needs of countries along the Belt & Road; deepen cooperation in industry and research.

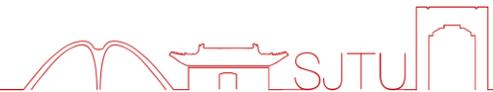
5. Construction of science and technology think tanks

Integrating elite intellectual and scientific resources across the Belt and Road, promoting think tanks' role in scientific and technology policymaking communications, technology strategies interlink, science and technology planning, and policy consulting research, etc.. While providing intellectual support for government decision-making as a civil organization.

Members of BRSIN



BRISN Development -- Established in 2016



Oct. 2016, held MOST "Construction and Management Training Class for Science Innovation System in Higher Education Institution".

- Eight countries including Egypt , Pakistan, Philippines, Kazakhstan, Sudan, Thailand, India and Indonesia
- 15 training class members from 14 higher education institutions.
- Adhere to the concept of mutual learning and mutual benefits
- Promote bilateral and multilateral cooperation among higher education institutions.
- Jointly construct and perfect science innovation management system



SJTU initiated the establishment of BRISN while science innovation center with global influence is under construction in Shanghai.

- Promote the development of mutual-learning and mutual-benefits "Science Innovation Community"
- Promote the joint cooperation among network members on major production-study technology



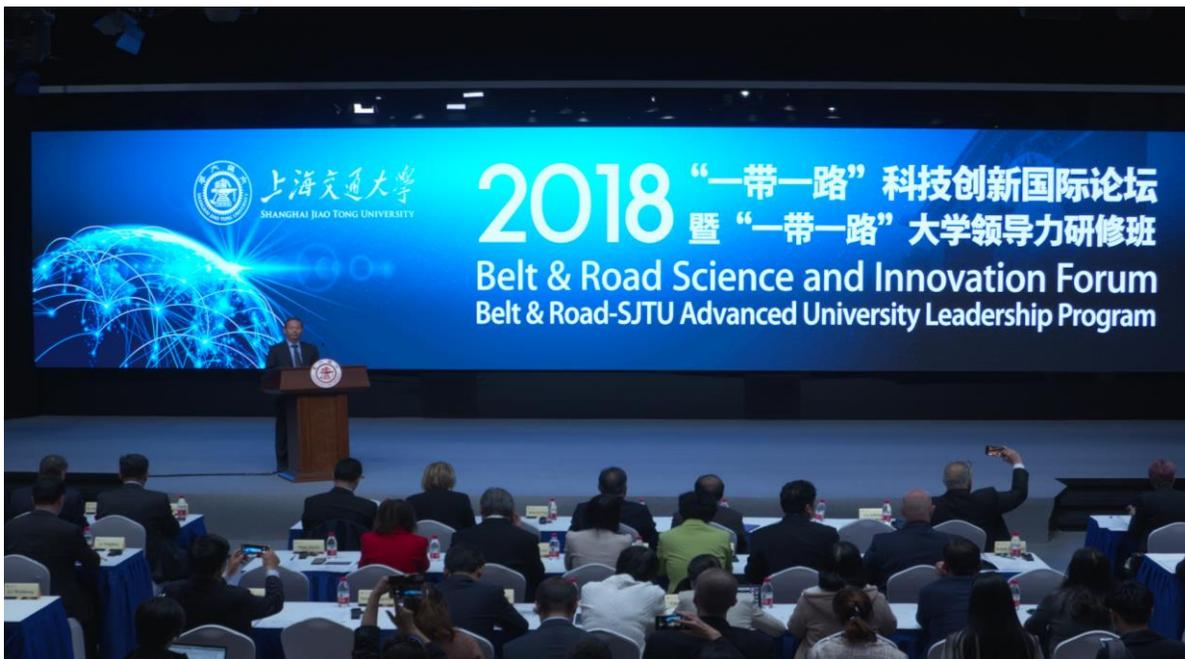
BRISN Development -- 2017 Summit



The first forum was successfully held in September 2017

Inclusion in the *Shanghai Service Country "Belt and Road" Bridgehead Action Plan*

BRISN Development -- 2018 Forum + Belt & Road-SJTU Advanced University Leadership Program



In November 2018, Belt & Road Science and Innovation Forum was successfully held again.

At the same time, Belt & Road-SJTU Advanced University Leadership Program was launched.

Sharing the development achievements of China's higher education in the new era with the universities along the Belt and Road to promote the openness, exchange and integration of higher education and to expand cooperation space and opportunities.

BRISN Development -- 2019 Forum + Research Leader Forum

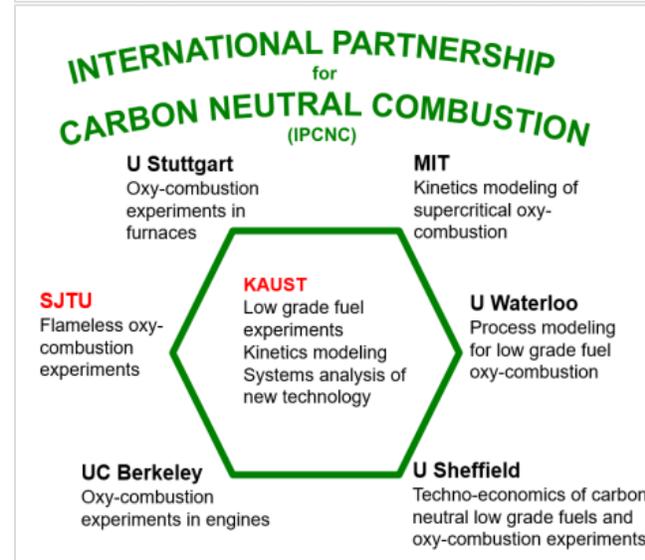


SISTM and CASICCB became new members of BRSIN
BRSIN Research Leader Forum was successfully held.

Successful Cases

China-Saudi combustion

- China is the largest oil importer and Saudi Arabia is the largest oil exporter. Combustion cooperation meets demand of both sides on energy and environment.
- strengthening personnel exchange, conduct major technology projects, facilitate synergy integration among industries, universities and research centers, and enhancing cultural exchanges
- SJTU is one of the top universities on power engineering and Engineering Thermal Physics. Research are strongly funded.
- Members of IPCNC (including KAUST/MIT/Berkeley etc)
- Signing cooperation with King Abdullah University of Science & Technology on Combustion Research Center
- Master exchange



Successful Cases

China-Russia Aerospace Lab

State: Russia, an aerospace power with strategic mutual trust

- ❑ Area : Aerospace, China-Russia wide-bodied airliner
- ❑ Cooperation party : Moscow Aviation Institute, the top aerospace institute in East Europe, most Russian aerospace talents graduated from here
- ❑ SJTU : Competitive engineering capacity and edge on international cooperation
- ❑ Collaboration: COMAC & AECC Commercial Aircraft Engine



Successful Cases

Bulgarian Center

Cooperation foundation

- ❑ Two China-Bulgaria Technology Exchange Projects held by the Ministry of Technology
- ❑ First China-Bulgaria Agricultural Cooperation Forum
- ❑ Agreement signing

Signing MOU with Bulgarian Academy of Sciences, Agricultural University Plovdiv, Sofia University, the University of National and World Economy and Sofia Agricultural Economic Institute and signing the Framework Agreement on Establishing SJTU Bulgarian Center at the University of National and World Economy.

❑ Bulgarian Cultural Festival

On June 15th, 2016, the first Bulgarian Cultural Festival was held in Shanghai Jiao Tong University Minhang campus.
On July 14th, 2017, the Second Bulgarian Cultural Festival.

Cooperation areas

- ❑ Agricultural environment security control
- ❑ Rural ecological culture preservation & development and industry development
- ❑ Aromatic plants development & application





Thank You!

19 November 2019



上海交通大学
SHANGHAI JIAO TONG UNIVERSITY