Executive Director, the Secretariat of the Alliance of International Science Organizations (ANSO) Prof. Jinghua CAO:

"Our Mission: Scientific Cooperation for Shared Development in the Belt & Road"

Prof. Jinghua Cao is Executive Director at the Secretariat of the Alliance of International Science Organizations (ANSO). Before his current position, Prof. Jinghua Cao was Director-General of the Bureau of International Cooperation (BIC) at the Chinese Academy of Sciences (CAS). He is an English major and graduated from the Beijing Foreign Languages Institute in 1982. He holds a master's degree in Business Management and International Policy from CCNY, U.S. (1987). He has worked in different posts that allowed him to gain experience in international relations at CAS such as Deputy Director of the Office of External Financing, Deputy Director and Director of the Office of American and Oceanian Affairs (BIC), Assistant Director, Deputy Director-General and Director-General of BIC. He also worked as a Second and First Secretary in the S&T Section of the Chinese Embassy in Washington D.C., US, from 1995 to 1997. His research interests are science policy and international cooperation in science and engineering. His publications include several articles in international SCI journals.

"Our vision is to and build a community for the whole humankind with a shared future under the principles of the BRI drawn discussions. We promote shared benefits with a set of concrete Science, Technology, Innovation, and Capacity building actions (STIC). The 2020 call for ideas and suggestions for ANSO-led collaborative research focused on four priority areas: Environmental challenges, agriculture & food security, health, well-being, and green technology. 75 proposals from ANSO members have been received with the participation of research institutes and universities in the BRI region. The ANSO Cross-cutting Platform includes the Health Corridor, Food Security Corridor, Green Technology Corridor, and would be developed Energy Corridor, which are developed to integrate various scientific research, innovation, and technology, and encourage tech transfer that benefits green development and human well-being. As an international science organization, ANSO attaches great importance to knowledge, information, communication, and dissemination. Very early on, almost one month after the outbreak of the pandemic, Chinese scientists developed the DNA sequencing information of COVID-19. ANSO used its own communication channel to quickly disseminate genome information to the rest of the world through our network or our newsletters."

Prof. Jinghua Cao answered the questions of BRIQ Editor Deniz Eren Erişen.

First, what kind of partnership does ANSO represent? Could you briefly tell us about the establishment process of ANSO and the scientific institutions and organizations cooperating with ANSO from the beginning?

Jinghua Cao: The Chinese Academy of Sciences (CAS) attaches tremendous importance to international collaboration. We consider international cooperation a key to CAS's continuous growth and development, and its continuing impact in the international scientific arena because you have to be engaged with the rest of the world to do innovative work. Today, innovation occurs in all parts of the world.

Transformations are occurring in different sectors of the economy. We want to be open to this change so we can continue to be innovative and contribute CAS's accomplishments to the rest of the world. When I was Director-General of the Bureau of International Cooperation of CAS, we gave particular emphasis to the internationality of CAS Science and Technology. We engaged a lot of countries and a lot of institutions. In the last couple of years of my term as Director-General of that department, we created about 10 overseas research and education sites and centers, from Chile to Brazil from Brazil to Sri Lanka and Central Asia. We also reached Kenya in Africa and Myanmar in Southeast Asia, for instance, where we have a biodiversity research centre.

Also, we had extensive engagements with institutions in many developed economies, including activity with the United States. For a time, we had a good partnership with US national lab under the U.S. Department of Energy and

some of the United States' universities. Also, the Max Planck Society in Germany and the National Research Center in France.

The Chinese Academy of Sciences took an important role in the creation of ANSO. As is known, the idea of establishing ANSO first appeared in the "First International Science Forum of National Scientific Organizations on the Belt and Road Initiative" held in Beijing in November 2016. This Forum resulted in the "Beijing Declaration." Can you tell us about the Chinese Academy of Sciences and its contributions to the Beijing Declaration?

Jinghua Cao: When the Belt and Road Initiative was proposed by the Chinese government, as the largest national R&D organization, CAS believed it should have a role in it, including our scientists from CAS and the Chinese community, and our international partners, they all thought so. They called for a more prominent role of Science and Technology collaboration in the quality development of the BRI. This is because scientists can look to a new paradigm through scientific collaboration.

My department played a critical role in immediately putting the CAS management ideas into practice. With international S&T community, we organized the first International Symposium on the Belt & Road. That brought together about thirty institutional members and roughly four hundred scientists. There were discussions centered around different topics, like natural disasters, prevention and mitigation of climate change, studies about biodiversity, and education and capacity building for a better future. There was also discussion about how we could

ANSO focuses on promoting scientific awareness, technological inclusion, knowledge sharing and capacity enhancement for combating desertification in the Belt and Road countries. (ANSO's website, 2020)

use the best scientific developments for a solution to address problems like drinking water and making life sustainable, and ensuring that we would have a robust variety of seeds to grow even under the impact of climate change.

ANSO emphasizes concrete actions, aiming to address problems rather than just produce strategic analysis and studies. But of course, strategic analysis is essential, too. This emphasis can gradually build up ANSO's international impact.

Our collaboration partners from overseas say "The Belt & Road Initiative does give a paradigm shift in terms of enhancing international collaboration". A lot of scientists want to use the opportunity to enhance the collaboration in their areas but of course for the general public good.

The Beijing Declaration contains three elements. The first element is to give a more prominent role of science and technology in the quality development of the Belt & Road. The second is to rely on international scientific collaboration for the constructive development of the Belt & Road. Third, we need to create some kind of platform or coordination mechanism to achieve synergy and cooperative effects and we can promote international collaboration for the benefits of green and sustainable development. "Green" and "sustainable" were keywords in the first Symposium. You see, to develop a quality Belt & Road, you have to be sustainable and green.

Delegates and representatives from twelve international institutions, universities, and international organizations, including CAS, held a meeting in Islamabad. We discussed and drafted the ANSO's statures. We did not have a good sense about how to create an international organization at the time. I did not realize how complicated it would be, but of course, and thanks to my previous engagement with The World Academy of Sciences (TWAS), InterAcademy Panel (IAP). We worked it out with international partners' assistance and came up with the draft of ANSO's statures. Then we circulated it to the institutions that participated in the first symposium. Of course, this is a very long and challenging process. Basically, you need to talk with all the stakeholders, you have to be as transparent as possible.

Many issues require a shared solution for the common future of humanity. These issues include climate change, resource problems, natural disasters, infectious diseases, and food security. What is ANSO's foresight in this context? How does ANSO support the Belt and Road Initiative for science-based solutions?

Jinghua Cao: We realized that we need to create an international science organization that emphasizes concrete actions. Our vision is to promote to promote the realization of the United Nations' Sustainable Development Goals (UN SDGs) and build a community for the whole of humankind with a shared future under the principles of the BRI drawn discussions. That's our aim! ANSO emphasizes concrete Science, Technology, Innovation, and Capacity building actions (STIC), aiming to address concrete problems rather than just producing strategic analysis and studies. But of course, strategic analysis is essential, too. This emphasis can gradually build up ANSO's international impact. So, we also engage in strategic studies, science policy analysis, advising the government and societies for science based decision-makings. The ANSO voice and influence are heard in the rest of the world.

We emphasize in our society how important it is to use solidarity and collaboration to achieve our goal. For example, if you don't wear a mask, you not only affect yourself but also others, including your neighbors, your relatives, and friends. So it's imperative to wear one. So that's why I would see that discipline is needed to address some of the challenges.

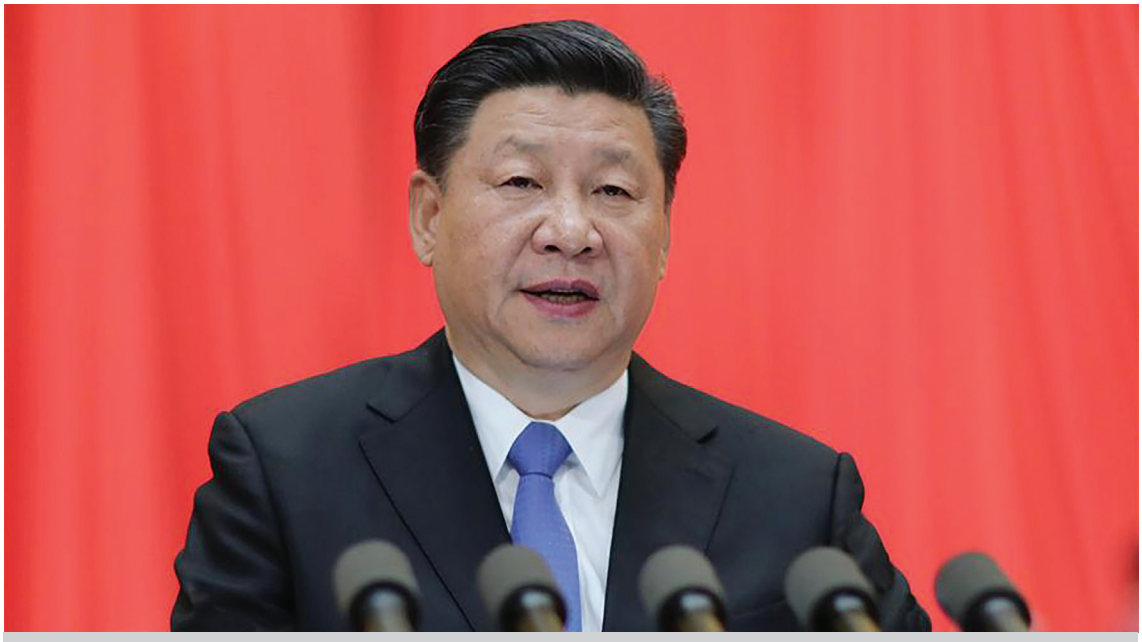
We designed our studies to be released to the rest of the world. We have also provided some strategic advice to my government on how to R&D develop a vaccine for public good under the pandemic, how can we turn a vaccine into a globally needed product, how we should intensify efforts to protect biodiversity conservation to global groups and how to prevent the occurrences of invasive species.

In terms of science-based advice, we are very proud to say that health has been a primary priority in our agenda even before the outbreak of the pandemic.

We conduct strategic studies because we can benefit from the contributions of scientists in China and international partners and some of the CAS academicians. We also have a few science ambassadors from selected overseas countries. They can help us promote green/sustainable concepts to promote global efforts to address climate change.

We see that ANSO provides an essential framework for scientific cooperation, especially for the Belt and Road nations. President Xi said, "Science has no (geographical) boundaries, but scientists have their homeland." What are the effects of President Xi and the Chinese Communist Party's programs on ANSO's projects?

Jinghua Cao: Let me answer this from two perspectives. One is that ANSO was created under the general framework of the BRI's proposal.



Chinese President Xi Jinping addresses the opening of the 19th Meeting of the Academicians of the Chinese Academy of Sciences in Beijing, capital of China, May 28, 2018. (Ju Peng/ Xinhua)

As I mentioned earlier, as the largest national science research organization, it would not be right for CAS to not play a role in this most prominent international collaboration proposal ever made by China. Look at the Belt & Road! The BRI is intended to add value to the global community, to create a better world, to create a community of the whole of humankind with a shared future to address our problems and achieve development. If you look at the issues and challenges we face, you would acknowledge the need to emphasize development, meanwhile, we should also emphasize green and sustainable development.

Putting together scientists with a worldwide vision will also resolve issues in their own homeland. I think that's a very wise idea and we encourage our scientists to contribute to the rest of the world.

I look at the UN SDGs as a publicly, globally accepted concept. I would say the Belt & Road is one of the best exercises in actively advancing the UN's actions for sustainable development. The BRI puts a lot of concrete actions in achieving globally designed objectives. It is a grant proposal, and it aims to a better world. The BRI also gives many wonderful opportunities for Chinese scientists to be interactive with global scientists to address global commonalities, common challenges such as climate change, environmental protection, and energy challenges. CAS has to be involved.

Of course, President Xi's thought also gives clear instructions that ANSO should be heading to green sustainable core development.

Gladly, through hard efforts, we got a letter of congratulations from President Xi at the launch of ANSO. President Xi indicated that in the letter, such collaboration enhances our policy capacity around the world, and addresses some of the common challenges that we all face. He, therefore, advises enhancing the role of the ANSO member institutions to address this challenge together. He pointed out some of the directions that ANSO should go in: BRI's construction is the road of green/sustainable development, the road of innovation, and the road of health. I have to say that ANSO's vision and objectives are clearly in line with UN SDGs, too. For the Chinese scientists, President Xi advises them not only to think about problems in China but we should also care about the rest of the world. Of course, we'll have to care about problems and challenges in our own home countries, so they are combined into a global attitude with home attitude. You can contribute to addressing the challenges of your country. You can also contribute to addressing global challenges. Putting together scientists with a worldwide vision will also resolve in their own homeland. I think that's a very wise idea and we encourage our scientists to contribute to the rest of the world. We're also told that things from other countries will work with both sides together to address global challenges.

One of the prominent studies supported by ANSO is the Multi-Model-Integrated Subseasonal-to-Seasonal Prediction and Application in Disaster Risk Reduction (MISSPAD). Could you inform us about MISSPAD, its activities, and networks?

Jinghua Cao: ANSO-MISSPAD is an important project that provides timely and effective weather and climate forecasting services. It offers regular academic seminars and short-

term training courses to improve the capability of forecasting disasters such as floods, droughts, high temperatures, cold waves, and typhoons. MISSPAD aims to protect people's lives and property in the Belt and Road countries and reduce losses from natural disasters. It has released more than ten newsletters, which made forecasts for the following seasons for Central Asia, South Asia, Southeast Asia. It has done excellent work predicting the spring drought in Southeast Asia, the typhoon season, the summer rainfall pattern, and the Arctic sea ice extent. ANSO-MISSPAD also works with partners to issue early warnings of extreme climate events.

I can give you an example of how it works. On September 3, 2020, a fully loaded oil tanker caught fire and lost power near the east coast of Sri Lanka. This tanker was 330 meters long and a huge crude oil carrier chartered by the Indian Oil company. Immediately after the accident, the ANSO-MISSPAD team launched the emergency forecast of Indian Ocean cyclones and ocean currents. The team provided the prediction results for relevant organizations and rescue teams in Sri Lanka. They also informed the ships nearby via media of the latest rescue situation and weather forecast to keep away from the sea areas in advance and pay attention to the changes of wind direction and ocean currents. The team was acknowledged by the Sri Lanka government and the Chinese Embassy in Sri Lanka. This incident highlighted the critical role MISSPAD plays

ANSO Collaborative Research Areas (ANSO website, http://www.anso.org.cn/programmes/flagshipProject/research/)

in international scientific cooperation and disaster prevention in the Belt and Road regions.

Could you give us information about other ANSO collaborative research that addresses sustainable development? How can health, food security, green technology, and energy corridors be improved based on ANSO-led projects?

Jinghua Cao: ANSO led collaborative research places emphasis on S&T cooperation and partnerships between ANSO Members and partners in areas of high importance for green and sustainable development. The 2020 call for ideas and suggestions for ANSO led collaborative research focused on four priority areas: Environmental challenges, agriculture & food security, health, well-being, and green technology. 75 proposals from ANSO members have been received with the participation of research institutes and universities in the BRI region. The ANSO Cross-cutting Platform includes the Health Corridor, Food Security Corridor, Green Technology Corridor, and would be developed Energy Corridor, which are developed to integrate various scientific research, innovation, and technology, and encourage tech transfer that benefits green development and human well-being.

Here are examples of the two corridors from the ANSO Cross-cutting Platform: The ANSO Food Security Corridor is set up to safeguard regional and global food security by improving agriculture science's research capacity and implementing the related advanced technology in the BRI regions. This platform extended in-depth cooperation and research for natural disaster prediction, hybrid rice and wheat, food productivity assessment, high-efficiency irrigation, and insect pest control.

One of the programs is Investigation and Monitoring of Agricultural and Forestry Pests in the Interior of Central Asia. This activity will carry out investigations on agricultural and forestry pest resources, collect specimens and samples of pests and assist the foreign partners in building the resource database of pest samples. The DNA barcode sequence of pests will be obtained to construct the DNA barcode database and form the rapid identification system of important harmful pests based on DNA barcode technology. The pest monitoring network will be established in Central Asia's interior based on China's mature pest monitoring technology and equipment to export biological control technology and products. It will demonstrate their applications in Uzbekistan, Kazakhstan, Tajikistan, Turkmenistan, and other countries. Through technical training and joint implementation, professional technical teams and young scientific researchers for Central Asia will be cultivated.

What about the Health Corridor?

Jinghua Cao: The ANSO Health Corridor is one of the flagship platforms focusing on technology transfer on Health Products, Clean Water, Low-Cost Medical Care, and Medicines & Vaccines. This platform puts a significant effort into setting up innovation-based enterprises to help high-quality development by integrating resources from different stakeholders. Regarding clean water technology, ANSO is promoting activities under the ANSO Health Corridor, for example, Feasible Technologies and Strategies for Safe Drinking Water in Southeast and South Asian Countries.

RCEES aims to establish collaborative research with distinguished scientists and experts to jointly develop feasible and sustainable drinking water purification technologies and integrated facilities for residents.

Drinking water safety is a big issue and a grand challenge for social development and human well-being in the "Belt and Road" countries. In the past ten years, the Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences (RCEES) has made significant progress in technology invention and implementation for rural areas, foreign-aid projects promotion, and international networks built-up. This ANSO activity aims to establish collaborative research with distinguished scientists and experts from Burma, Nepal, Sri Lanka, and Bangladesh to jointly develop feasible and sustainable drinking water purification technologies and integrated facilities for residents. Additionally, it will help establish the ANSO regional network in the water and environment field for sustainable cooperation among the Southeast and South Asian countries and accelerate knowledge transfer and experience sharing under the ANSO framework.

We are curious about ANSO's examples of international cooperation in combating COVID-19. Has ANSO been effective in vaccine development and phases of clinical research and data processing on vaccines' effects on communities

Jinghua Cao: As an international science organization, ANSO attaches great importance to knowledge, information, communication, and dissemination. Very early on, almost one month after the outbreak of the pandemic, Chinese scientists developed the DNA sequencing information of the COVID-19.

ANSO has its own communication channel to quickly disseminate genome information to the rest of the world through our network or our newsletters. The President of ANSO gave specific emphasis on that. We need to release this information and share it with the rest of the global community as quickly as possible because that is valuable information for the development of testing kits, vaccines, and drugs. So, we did play a very effective role in disseminating knowledge.

In terms of the active development of vaccines and drugs, ANSO is an international scientific organization. We rely on research institutions and universities outside of international labs. We assisted our scientists in achieving several partnerships, for instance, with Brazil. We supported each other's efforts to create quick testing kits. They have achieved a lot of progress. We also help our institute in Shanghai, Shanghai Institute of Materia Medica, to create a partnership in developing drugs against the virus. Through that partnership, they identified a unique local drug with Uzbekistan. Uzbekistan quickly approved it for emergency use.

I'm proud to say that ANSO has played a major role in conducting the third phase in clinical trials of protein-based vaccine developed by CAS, Institute of Microbiology, and China's Anhui Zhifei Longcom Vaccine company. We reached 7,000 subjects already during Phase trials. And Phase III clinical trials are going on in Uzbekistan. We also conducted the trial in Pakistan. ANSO is playing a role in the communication and organizing of trials. We

Scientists conduct clinical researches for vaccine against COVID-19. (CGTN, 2020)

had a role in organizing over 20 different webinars to locate good international partnerships to carry out the third phrase clinical trials of that vaccine candidate.

It is an effort to show we have another public vaccine candidate not only for the benefit of China but also for the rest of the world. The advantage of this vaccine is that it can be transported and stored at an average temperature from 2 to 8 ˚C. Still, the mRNA vaccines produced by Pfizer or Moderna can only be transported and stored at low temperatures. Pfizer needs -18 ˚C, and Moderna needs -20 ˚C. It is very hard to use them unless you have a facility. Arrangement of logistic requirements is very tough, especially for developing countries. So ANSO tries to share and promote alternatives.

ANSO believes health and diseases are a big issue; we think that ANSO should play a more critical role. We are engaging with the Bill Gates Foundation to develop vaccines not only for COVID-19 but for other infectious diseases. We can have a more prominent role in developing some of the vaccines that humankind needs.

In addition to vaccines, ANSO organized several major international conferences discussing the numerous scientific developments and achievements in the development of testing kits, drugs, and vaccines.

We see that China is relatively more experienced and more predictive in combating the pandemic than Western countries. One of the remarkable events of ANSO, especially before the pandemic, is the International Conference on Silk-road Disaster Risk Reduction and Sustainable Development. What can you say about the scope and outcomes of this conference?

Jinghua Cao: The Belt and Road countries' environments vary across regions, and there are frequent natural disasters like earthquakes, floods, and droughts. These factors threaten the

regional development and peoples' livelihood. According to United Nations data, the disaster losses in the Belt and Road countries are twice more than the world average. Clearly, there is an urgent need to promote international cooperation in disaster risk reduction and sustainable development along the Silk Road. It was crucial and necessary to hold this conference. It aimed to enhance the Belt and Road Countries' resilience against natural hazards and their ability to secure peoples' livelihood. We brought together over one thousand leading scientists, researchers, and scholars along the Silk Road countries to exchange their experiences and research results about disaster prevention and sustainable development.

ANSO-DRR's goal is to build an international platform for joint research and sharing information on natural disaster studies. It also includes resource development, ecological protection, disaster mitigation, sustainable development, and personnel training.

This conference's most outstanding outcome is the founding of the Alliance of International Science Organizations on Disaster Risk Reduction (ANSO-DRR). Its goal is to build an international platform for joint research and sharing information on natural disaster studies. It also includes resource development, ecological protection, disaster mitigation, sustainable development, and personnel training. In the future, ANSO-DRR will promote international cooperation in disaster risk reduction along the Silk Road, advance the implementation of the Sendai Framework for Disaster Risk Reduction and the Sustainable Development Goals 2030. Hopefully, it will contribute to the construction of a Community of the shared future for mankind.

ANSO-DRR now has nearly thirty members and successfully held many training courses about disaster prevention along the Silk Road. It has provided crucial support for the risk analysis and disaster reduction among the Belt and Road countries. Its influence is growing stronger worldwide

ANSO's support for scientific and academic education is known mainly by graduate students and young academics. What is ANSO's support for graduate students, junior researchers, and young academics?

Jinghua Cao: I admit that the pandemic has had adverse impacts on some ANSO programs. Otherwise, we would have launched more young mobility programs. For instance, we designed a program to share the ample scientific facilities of China for scientists all around the world, primarily young scientists from developing countries. China has lots of large science facilities, like particle physics, giant telescopes, and the Five-hundred-meter Aperture Spherical Radio Telescope in Shanghai.

China has a large number of research facilities we want to share with the rest of the world for research and innovation, not only with Western countries but also with our neighbors and developing countries such in the Five-hundred-meter Aperture Spherical radio Telescope (FAST), Experimental Advanced Superconducting Tokamak (EAST) and so on. Young scientists in their early career in science, trying to find research partnership opportunities are welcomed to apply for the program. Senior scientists worldwide will also be invited to carry out first-class scientific projects on our facilities.

The First ANSO Young Scientists Forum held in Hangzhou on November 9th, 2019. (ANSO, 2019)

We have another program for young scientists who graduated from CAS institutes as previous PhD students. After completing their PhD, they want to return to their homeland, they may join a university in Kenya, in Turkey, in South Africa. We want to provide them with some of the best minds. They have to be very scientific and show tremendous potential to be career scientists. We want to create funding to help them get connected with home institutions and with mentors and collaborators from China. This will create a long-term international partnership for specific countries and the needs of science continue to push scientific development in particular areas. ANSO is willing to act as an extended value-added platform of the existing CAS international collaboration. Within CAS, they have an international collaboration department. ANSO is designed initially for collaboration with developing countries.

CAS has an extended international collaboration portfolio with many programs that encourage international scientist mobility for both young and seniors.

We heard that ANSO is creating a technology transfer platform between developing nations. Could you give more details about this platform?

Jinghua Cao: To answer that question, the best way is to investigate ANSO's work or strategic priorities. We have a range of tools to achieve

our region and objectives at home. We hope that funding can also come from our collaborators a little bit. That will make a big difference instead of only just one way of funding. If some local institutions can contribute a little bit of the financing to a particular product, that's the thing we welcome the most. Look at the five elements of strategic priorities of ANSO, like climate change and biodiversity conservation, which support ANSO's portfolio and why ANSO is a big science organization. That is science-based, but also very relevant to achieving a better life.

Firstly, understanding the current capacity for research is essential for significant scientific applications that must be calculated in common. Second, addressing country-specific challenges like pollution and especially lake pollution is important for drinking water. Countries from Central Asia to Africa need help to get drinking water. The third is the capacity for construction. The fourth is a science-based solution for facilities. And the last that you referred to in this question is technology transfer. There are technologies that offer solutions for certain local needs in some of the developing countries within the BRI frame. We are also interested in bringing some of the solutions, particularly science-based solutions for the BRI countries.

CAS has relationships with about 500 high tech companies. The organization in place is effective, but we still haven't created the international tech transfer chapter. It is on our agenda. For the science agenda, you can organize many meetings; you can do whatever, but in technology, it is a little different, and if you don't organize in the right way, you will not achieve your purpose. You will lose the confidence and trust of the other side. We are currently creating a city tech transfer platform with a branch of the Beijing Municipal Government. We hope that we can collect resources and network with talents across the country under the ANSO platform.

Thank you very much for your time, Prof. Cao. Is there anything else that you would like to add?

Jinghua Cao: Let me add two aspects. ANSO is one of the two professional organizations that are approved by the Chinese government and registered to the Ministry of Civil Affairs. The other one is the Belt and Road International Lawyers Association (BRILA). BRILA targets at promoting legal cooperation. In natural sciences, ANSO is the only international science organization officially approved by the Chinese government and registered as NGO. We feel that we have a bright future. We need a lot of people to enhance ANSO, including journalists and the scientific press. If you have good ideas, you can contact to us and we will welcome it.

My last word is, when you build an infrastructure, you need people. Infrastructures are the bones of a person, but you also need flesh; you need muscles to hold a person together. ANSO is trying to contribute to the soft tissue of the BRI.