

{No.7 Vol. 168}

Shanghai Center for Pujiang Innovation Forum

September 22, 2023

2023 Pujiang Innovation Forum Bulletin VII

**Seizing future opportunities of open science and unleashing the
infinite vitality of young talents**

Editor's Note: The Young Elite Scientist Summit of the Pujiang Innovation Forum 2023, with the theme of " Open science: Embrace the Future of Knowledge Sharing and Scientific Cooperation ", invited young technological talents both at home and abroad to explore the value and practice of open science in depth. This bulletin summarizes views of guests at the Young Elite Scientist Summit for your reference.

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Seizing future opportunities of open science and unleashing the infinite vitality of young talents

General Secretary Xi Jinping pointed out that young talents are the active source of national strategic talents, and more trust, and better assistance and support should be given to young people. Currently, the open science initiative that shoulders the mission of the times is becoming a global consensus, and young scientists also shoulder the important mission of turning the initiative into reality. The guests present agreed that **breaking disciplinary boundaries and realizing data openness is the only way to realize open science, but there are still some challenges in knowledge and data sharing. We should seize development opportunities of open science, and guide young talents to participate actively in and practice the new paradigm of open science by creating an open and inclusive international technological innovation environment and building a platform for young international talents.**

I. Crossover and integration is the only approach to open science.

First, the opening and fusion of disciplinary boundaries will significantly improve innovation efficiency. Liu Ying, Professor and Associate Dean of the College of Future Technology and Vice President of the Institute of Molecular Medicine, Peking University, said that aging in biology is a very complex process that is not caused by any single factor. Currently, there is no consensus on mechanisms and causes of

aging, and solutions thereto in the academic community, and scientists' understanding of this problem is far from enough. Therefore, more people in different research directions are urgently needed to participate in research in this field. Lu Boxun, Professor at the School of Life Sciences, Fudan University, pointed out that with the assistance of AI technology, the efficiency of drug R&D will be greatly improved. For example, a biopharmaceutical enterprise's database has over 3 million data entries on compounds. If these compounds are screened for binding to specific proteins for a specific target, a tremendous time and high costs will be consumed, while introducing an AI big model for virtual screening will shorten drug development lead times and improve R&D efficiency significantly.

Second, interdisciplinary crossover will drive the development of more frontier fields. Pier-Luc Tremblay, Professor at the School of Chemistry, Chemical Engineering and Life Sciences, Wuhan University of Technology, proposed to integrate chemistry and biology to carry out research on biological corrosion, providing a new technical tool to address this phenomenon that causes losses of \$2.7 trillion annually. **Lu Boxun** mentioned that the fusion of AI and gene technologies has given rise to many frontier research fields. For example, by using machine learning to analyze and predict RNA structures, scientists have been able to design corresponding RNA vaccines for viral sequences. Clinical trials have proven preliminarily that RNA vaccines produced using this method are much better than conventional methods in therapeutic effect and efficiency.

Third, the opening of scientific data is conducive to the

development of new application scenarios. Li Xuecao, Professor at the College of Land Science and Technology, China Agricultural University, pointed out that since one decade ago, more and more open data on remote sensing at home and abroad have been available to scientists, leading to explosive growth in the application of remote sensing technology. In 2022, remote sensing science and technology was elevated to a first-level discipline. It has expanded gradually from a niche technology to a larger scale, and become a technology closely related to daily life. Now, from drone aerial photography to satellite-scale observation, scientists can integrate data of different scales on Earth and develop more application scenarios. **Zhang Xiao, Head of the SSV Data Center and Deputy General Manager of the Technology Department of Tencent,** thought that the sharing of core scientific research knowledge and data is the cornerstone of technological development of mankind and also the foundation of open science. Generative AI can utilize the efficient summarization, generalization and understanding capabilities of large language models based on massive scientific research sub-vertical data to help researchers find truly relevant parts in massive data. In addition, with the help of generative AI, we can develop corresponding technologies and products in scenarios such as agriculture, education and emergency training.

II. Knowledge sharing and data openness still face severe challenges.

First, it is difficult to establish a mutually beneficial and win-win mechanism for knowledge sharing. Li Xuecao pointed out that although data sharing may seem simple, it is actually a relatively difficult

task that requires sound systems of patent protection, data intellectual property protection, etc. to protect the interests of all data owners. **Mariana Lyra Silveira, Ph.D. in Electrical Engineering, Federal University of Espírito Santo (UFES)**, proposed that the biggest challenge to knowledge sharing lies in the free access to internet academic resources, such as digital libraries. Currently, most repositories of academic journals are paid, which restricts the sharing of academic knowledge. **u Kequan, Research Fellow at the College of Civil Engineering, Tongji University**, thought that the current anti-globalization trend hinders exchanges among international researchers and lowers the efficiency of open science.

Second, the problem of technical support for data sharing has not been solved. **Li Xin**, Deputy Director-General of the Department of Foreign Expert Services, Ministry of Science and Technology, stated that our country has released many policy documents on scientific research data sharing and established the National Data Bureau, but still faces many policy and data challenges. Sun Bowen, Technical Director of Reliable AI "Ant Authentication" and Director of AI Engineering Infrastructure of Ant Group, said that generative AI is exposed to many technical security risks, such as audio, video and image falsification, contamination of low-quality generative AI content, and infringement of AI generated content. **Li Xuecao** thought that data management and storage models should be further optimized to minimize repetitive data collection, and better coordinate and efficiently utilize nationwide scientific and technological innovation resources. **Anna Kostianko, Distinguished Professor of Zhejiang Normal University**, pointed out

that the biggest challenge to open science lies in the difficulty of realizing complete and equal openness, and researchers face many difficulties in accessing journal resources across disciplines, different fields and different periods.

III. Guide young scientists to actively practice open science.

On the one hand, we should create an open and inclusive growth environment for young talents. Li Xin pointed out that China has issued a series of policies, including Several Measures to Further Strengthen the Training and Use of Young Technological Talents, the Joint Action Initiative on Supporting the Comprehensive Development of Young Technological Talents, and the Notice on Carrying out the Special Campaign to Reduce Burdens of Young Researchers, in order to steadily increase the scale of funding from the National Natural Science Foundation for young technological talents, encourage national scientific and technological innovation bases to initiate research projects for them independently, reduce their burdens, and create an open and inclusive growth environment for them.

On the other hand, international exchanges and cooperation among young talents should be strengthened. Li Xin mentioned that a number of world-class or even globally unique big science programs and projects established in China have attracted scientists from all countries, including young scientists, to China for innovation and entrepreneurship, and a high-level international talent research platform has been established. For example, Experimental Advanced Superconductive Tokamak (EAST) in Hefei has attracted many young scientists, including

foreign ones, to work in China. The Five-hundred-meter Aperture Spherical radio Telescope (FAST) in Guizhou has attracted a large number of young foreign scientists to participate in global observation programs. **Michelli Pereira da Costa, Professor of the Faculty of Information Science, University of Brasília,** thought that open international exchanges and cooperation help elevate the common international scientific research status of both parties. By working together with public universities and research institutions to create an open science platform, young Brazilian researchers have improved their academic exchange efficiency, and benefited from more transparent academic knowledge sharing.

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