Post-Print: Upholding the Positioning of Pilot Special Projects, Highlighting Major Output Orientation, and Concentrating Efforts on Implementing the "Pioneering Action" Plan

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Abstract

The National Science and Technology Innovation Conference sounded the clarion call for advancing toward a world leader in science and technology, the National Innovation-Driven Development Strategy Outline and the National 13th Five-Year Plan were officially released, and a series of major initiatives including deepening the reform of the science and technology system and the "streamline administration, delegate power, and improve regulation" reform were steadily implemented, launching a new journey toward building an innovative country and a world science and technology powerhouse. Facing the new situation and new requirements, the Chinese Academy of Sciences (CAS), as a national strategic scientific and technological force, has always borne in mind its historical mission of "innovating science and technology, serving the nation, and benefiting the people," and is committed to producing a batch of major original achievements of symbolic significance in building an innovative country, a batch of major strategic technologies and products with high visibility, and a batch of major demonstration and transformation projects with significant benefits and leading, driving effects (hereinafter referred to as the "Three Majors"), so as to provide more effective and high-end scientific and technological supply to meet national strategic needs and economic and social development. Under the guidance of the "Pioneering Action" Plan, CAS has taken the Strategic Priority Research Program (hereinafter referred to as the "Priority Program") as an important vehicle, focused on building an organizational model for scientific and technological innovation activities that concentrates resources to accomplish major tasks, achieved a series of outstanding results with significant impact, and fully played its leading and exemplary role as a backbone force.

Full Text

Preamble

The National Science and Technology Innovation Conference has sounded the clarion call to march toward becoming a world leader in science and technology. With the official release of the National Innovation-Driven Development Strategy Outline and the 13th Five-Year Plan, along with the steady implementation of major initiatives to deepen reform of the science and technology system and delegate power while improving regulation and services, China has embarked on a new journey to build an innovative nation and a world leader in science and technology. Facing this new situation and these new requirements, the Chinese Academy of Sciences (CAS), as a national strategic scientific force, has always remembered its historical mission to "innovate in science and technology, serve the nation, and benefit the people." CAS is committed to producing a batch of major original achievements that will be symbolic in building an innovative nation, a batch of major strategic technologies and products with high visibility, and a batch of major demonstration and transformation projects with significant benefits and leading, driving roles (hereinafter referred to as the "Three Major Outputs"), thereby providing more effective and high-end scientific and technological supply to meet national strategic needs and economic and social development. Under the leadership of the "Pioneer Action" Plan, CAS has used the Strategic Priority Research Program (hereinafter referred to as the "Program") as an important vehicle to build an organizational model for scientific and technological innovation activities that concentrates resources to accomplish major tasks, achieving a series of prominent results with significant impact and fully playing a leading and exemplary role.

The Program was approved by the State Council at its 105th executive meeting in 2010. It is a major scientific and technological task deployed and implemented by CAS with foresight, targeting major scientific and technological issues related to the nation's overall and long-term development. It is a strategic action plan that integrates scientific and technological research, team building, and platform construction to form major innovative breakthroughs and cluster advantages. The Program is divided into two categories: Category A focuses on breaking through key core scientific and technological issues to promote technological transformation and the formation and development of emerging industries; Category B focuses on basic and interdisciplinary frontier directions to occupy the commanding heights of future science and technology. To date, CAS has gathered superior forces both inside and outside the Academy to launch 12 Category A programs, including "Stem Cell and Regenerative Medicine Research," and 24 Category B programs, including "Coherent Control of Quantum Systems."

Through the implementation of the Program, CAS has formed a number of new growth points and new competitive advantages in several major innovation fields, achieving a batch of landmark results (approximately half of CAS's major landmark progress during the 12th Five-Year Plan period is closely related to the

Program), winning outstanding social reputation in scientific development and serving economic and social development; it has gathered a group of outstanding key talents in related fields, creating some scientific and technological leaders; it has guided and promoted the establishment of relevant national major science and technology plans, effectively playing a pioneering role. At the same time, it has accumulated experience and laid a foundation for the construction of national laboratories and four types of institutions.

For example, the "Wukong" and "Mozi" satellites completed under the "Space Science" Program were cited by President Xi Jinping in his 2016 and 2017 New Year addresses as representative progress in China's scientific and technological undertakings. The "Stem Cell and Regenerative Medicine Research" Program has obtained brand-new artificial cell types, achieved same-sex reproduction with haploid stem cells, obtained functional sperm "in vitro," succeeded in clinical research on endometrial regeneration, and opened the door for spinal cord injury repair.

The "Future Advanced Nuclear Fission Energy Program—ADS System" Program originally proposed the new concept of accelerator-driven advanced nuclear energy systems, and the developed high-current superconducting linear accelerator prototype has repeatedly set world records for proton continuous beam and pulsed beam intensity. The "Personalized Medicine—Affordable New Drug Development Based on Disease Molecular Classification" Program conducted Phase III clinical trials of the world's first anti-Alzheimer's drug candidate 971 targeting Aβ, as well as research on its impact on biomarkers for efficacy indicators in Alzheimer's patients, leading the international direction of Alzheimer's drug development. The "Research and Breakthrough of Frontier Scientific and Technological Issues in the Hadal Trench" Program achieved China's first unmanned deep diving and exploration in the 10,000-meter-class trench area, marking China's official entry into the era of deep-sea science and technology at the 10,000-meter level. Research results from the "Regulation of New Topological and Superconducting States of Matter" and "Coherent Control of Quantum Systems" Programs won the first prize of the National Natural Science Award in 2013 and 2015, respectively. Two achievements, "Realization of Quantum Teleportation of Multiple Degrees of Freedom of a Single Photon" and "Discovery of Weyl Fermions," were both selected as one of the top ten breakthroughs in Physics World in 2015.

To promote major outputs, CAS has explored and achieved a positive interaction between scientific and technological innovation and management innovation in the Program. It has always adhered to its strategic positioning, attached great importance to top-level design, and taken institutionalized organization and multidisciplinary integration as core advantages to strengthen macro-level understanding and strategic judgment, organizing and planning from top to bottom, collaborating to tackle key problems, and advancing systematically. At the same time, it has established a management system for organizing and implementing major innovation activities around the Program, with scientific norms,

democratic decision-making, and clear rights and responsibilities. In implementation, it has established and improved an operational mechanism in which decision-making, execution, and evaluation are relatively independent yet organically connected and mutually reinforcing. It has adhered to high standards and strict requirements, earnestly implementing process management, inspection and acceptance, and post-evaluation systems. The Program's scientific research performance management work has been commended by the Ministry of Finance for three consecutive years.

The Bulletin of the Chinese Academy of Sciences has planned and organized this special issue to comprehensively summarize and showcase the progress of various Program projects and innovations in management systems and operational mechanisms. It is hoped that the scientific and technological community and all sectors of society will continue to strongly support the implementation of the Program and welcome valuable opinions and suggestions on the development of the Program and the promotion and application of its results. At the same time, we would like to take this opportunity to pay tribute to and express gratitude to the vast number of scientific and technological workers both inside and outside the Academy who have participated in the Program.

CAS is a national strategic scientific force that the Party, the state, and the people can rely on and trust. The Program is an important strategic task entrusted to CAS by the Party Central Committee and the State Council. Looking to the future, CAS will further clarify the positioning of the Program, focus on strategic goals and major innovation directions in accordance with the requirements of the "Three Major Outputs," fully demonstrate the Program's forward-looking, strategic, and pioneering nature, continuously strengthen target management and process management, enhance collaborative innovation, and ensure that the Program becomes an important source of major achievements, so as to further promote the smooth implementation of the "Pioneer Action" Plan and make due major innovative contributions as a national strategic scientific force to building an innovative nation and a world leader in science and technology.

Figures

Figure 1: Figure 1