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Think Tank Science and Engineering: Construction of New High-end Think Tank Starts from Specialization, Scientification to Disciplinization—Interview with Professor PAN Jiaofeng

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The construction of new high-end think tanks with Chinese characteristics has been in the "fast lane" since the 18th National Congress of the Communist Party of China and is entering a new stage of high-quality development. What is the development process of think tank methodology with Chinese characteristics? How should think tank construction advance from specialization to scientification and then to disciplinization and finally establish a discipline system? To answer these questions, the Bulletin of Chinese Academy of Sciences (BCAS) interviewed Professor PAN Jiaofeng, President of the Institutes of Science and Development, Chinese Academy of Sciences (CASISD).

BCAS: The construction of new high-end think tanks in China is now experiencing high-quality development, what are the keys to the high-quality think tank development?

PAN Jiaofeng: Since the 18th National Congress of the Communist Party of China, the construction of new think tanks with Chinese characteristics has experienced rapid development. The role and value of think tanks have been generally recognized and the activity and influence of think tanks have become increasingly apparent. Think tank construction is currently entering a new stage of high-quality development characterized by the transition from quantitative expansion to connotation improvement.

According to my observation and analysis in the long-term practice involving in the construction of high-end think tanks, there are six key factors for the high-quality development of think tanks: (1) effective institutional arrangement; (2) smooth supply and demand matching mechanism; (3) specialized think tank institutions and talents; (4) clear and actionable standards and specifications; (5) scientific methodology; and (6) extensive international exchanges.

(1) From the perspective of effective institutional arrangements, the central government of China has taken the construction of high-end think tanks as an institutional arrangement for the modernization of national governance system and governance capacity. With the in-depth advancement of pilot construction of high-end think tanks, some exploratory practice and experience have been integrated into institutional building. At present, the overall framework of institutions can meet the needs of high-quality development of think tanks.

(2) From the perspective of smooth supply and demand matching mechanism, the agencies involved in pilot construction of high-end think tanks have established regularly direct connection mechanisms with relevant central and state decision-making departments. Such connection mechanisms cover talent flow, direct assignment of tasks, exchanges during research process, sharing of information, and direct reporting of research results. A mechanism for connecting decision-making demand with consultation research and countermeasure research has been initially established. Other think tanks have also achieved positive results in establishing the mechanisms for connecting with the clients of decision-making services. The mismatch issue between supply and demand has been gradually solved based on these mechanisms. That is, the specificity of services provided for decision makers has been increased to improve the quality of think tank achievements.

(3) From the perspective of specialized think tank institutions and talents, China has established a think tank system led by national high-end think tanks and composed of specialized think tanks with multiple main bodies, diverse types, distinct levels, and different characteristics. According to the statistics, the number of specialized think tanks in China is at the top of the world, and full-time researchers and specialized

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research teams keep growing. There are even more research institutions, universities and colleges, social organizations, and professional researchers that are involved in think tank research. The foundation made of organizations and talents for the high-quality development of think tank has become increasingly solid.

(4) From the perspective of clear and actionable standards and specifications, value-orientation and standards are lacking for topic selection, process management, result assessment, and talent evaluation of think tank research. Taking think tank research results as an example, we need to make clear the nature, type, and characteristics of the products provided by think tanks before setting the criteria for evaluating different types of results. The consultation products for decision makers provided by think tanks can be classified into four categories: data- and knowledge-based products; information-, evidence-, or survey-based products; idea- and opinion-based products; and solution-based products. At present, the profound idea- and opinion-based products, as well as the systematic solutions to major decision-making issues, are insufficient. The true value of think tank should be to innovate idea and guide practice, and the golden standard for testing think tank products should be the ability to provide systematic solutions to think tank problems.

(5) From the perspective of scientific methodology, think tanks study the complex problems involving multiple disciplines and fields to provide policy suggestions or solutions. The complexity of research objects and the practicality of research results suggest that think tank methodology is of great importance. Many well-known think tanks in the world have attached great importance to innovating research methods for specific problems to improve the scientificity of research and have developed a variety of qualitative and quantitative research methods. Nevertheless, these methods show clear instrumental characteristics while lack systematic perspective and methodological innovation, which is mainly due to the lack of understanding of the laws of think tank research and the absence of a think tank theoretical system. Advancing from specialization to scientification needs the development of think tank methodology with universal applicability and the innovation of tools for solving problems in specific fields, which is essential to improve quality of think tank research. This is a major urgent issue faced by many think tanks, and addressing this issue will become a major theoretical contribution to the construction of new high-end think tanks in China.

(6) From the perspective of extensive international exchanges, the problems considered and solutions proposed by think tanks should be valuable and meaningful for global development. A global vision is necessary for gathering global wisdom. Internationalization is an inherent feature of think tanks, and every think tank should have extensive international exchanges. The world is undergoing profound changes unseen in a century. Think tanks are in urgent need to plays a role as a bridge, a link, or a network in foreseeing the trend of global development, solving the major challenges faced by the entire humanity, and building a community with a shared future for mankind. We should strengthen international exchange and cooperation in think tank research so as to jointly put forward solutions that benefit the development of the world, the prosperity of people, and the progress of civilization.

BCAS: In the process of think tank construction, how do you incorporate problem orientation, evidence orientation, and science orientation into think tank research?

PAN Jiaofeng: Think tank research starts with problem analysis. Problem orientation means focusing on the research problems, clarifying the real needs of decision-making, studying the real problems, and deeply understanding the problems and research objects. First, we need to have a clear understanding for the category of research problem. That is, we should make it clear that the problem studied by think tank is associated with strategy, measures, management, or policy. The final solutions or suggestions for different problems have specific emphasis and vary greatly. Second, we should understand the disciplines and fields involving the research problem. By defining the problem domain, we can extract the key elements and decompose the problem into a set of interconnected sub-problems in single disciplines or fields that can be handled by researchers with the existing knowledge. Third, through problem decomposition, we can find experts in related fields, available research results, and research conclusions with consensus, so as to make full use of the existing research achievements and knowledge. Fourth, main body should be identified. Only after identifying main body can we comprehensively consider the interests of different main body during research, apply game theory, perform simulation, and further put forward suggestions that can take into account and balance the interests of all participating body.

Evidence orientation demonstrates the evidence-based process and reflects the objectivity and independence of think tank research. Think tanks cannot completely quantify the problem and sometimes can only provide a qualitative judgment, which requires evidence or objective facts that can support the judgment. Meanwhile, quantitative data and evidence enhance the scientificity, reliability, and feasibility of research conclusions. This is helpful to gain the understanding and recognition of decision makers, benefited bodies, and the public. Through evidence-orientation, objectivity can be truly imported into the research process.

Science orientation emphasizes that scientific attitude, method, and practice should be adopted throughout think tank research. Once the policy suggestions proposed by think

tanks are adopted by decision makers, they will produce extensive and profound social impact. Therefore, the suggestions should be developed with great caution and a rigorous, scientific, and responsible attitude in the research process. Suitable methods should be adopted for addressing different problems. We should make full use of the existing knowledge and experience to perform evidence-based research and verification and incorporate problem-orientation, evidence-orientation, and science-orientation into the whole process of think tank research, thus improving the quality of research.

BCAS: You have successively proposed the Data-Information-Intelligence-Solution (DIIS), Double Helix Methodology composed of DIIS and Mechanism-Impact-Policy-Solution (MIPS), and "four layers." What are the practical exploration, logical evolution, and theoretical iteration during the evolution of the methodology?

PAN Jiaofeng: In 2007, the Chinese Academy of Sciences organized a strategic research project on China's Roadmap for Science and Technology Development Towards 2050. During the research process, we attached great importance to method selection, overall organization, and implementation. We employed the roadmap method to connect the demands, goals, tasks, key scientific and technological problems, implementation pathways, and supporting measures. After two years of research, a set of influential strategic reports *Innovation 2050: Science and Technology and the Future of China* was presented. The reports fully demonstrated the systematicness, scientificity, strategicness, and foresight of the research. The reports have influenced subsequent strategic studies. For example, the *Vision 2020: The Emerging Trends in Science & Technology and Strategic Option of China* published in 2013 also adopted such idea and method.

Since 2016, we have participated in the pilot construction of national high-end think tanks. In this process, we have encountered a number of comprehensive complex problems involving all aspects of the economy and society. On the basis of the existing research on science and technology development strategies, we summarized the experience in the new research practice and abstracted the essential and standard processes in the research on think tank problems, thereby proposing the DIIS methodology based on problem-orientation, evidence-orientation, and science-orientation. Instead of simply relying on data, the DIIS, under the guidance of the three orientations, combines data, information, intelligence, and solution to establish the standards of research and integrate the systematic and evidence-based thinking into all the processes of think tank research. Therefore, we call the DIIS a process fusion method. It has been adopted in practice and demonstrated solid performance in improving the quality of think tank research.

On this basis, we further realized that the logic and connotation of think tank research involve mechanism, impact, and policy.

Any think tank problem is complex and comprehensive from the research object, which involves different disciplines and fields and requires the study of the law of their interactions, a process called mechanism analysis.

On the basis of the mechanism analysis of think tank problem, we should perform impact analysis to reveal the impacts of the problem on the economy, society, science and technology, culture, and environment. Objectively understanding the extent and scope of the impacts is helpful to determine the decision-making value and importance of the problem.

This is followed by policy analysis. What are relevant policies? What are the impacts of these policies? Are these effects positive or negative? What new policies (solutions) are needed to address these problems? What will be the impacts of the new policies?

Think tank research involves mechanism, impact, and policy, which need analysis, iteration, and convergence, and this is called the MIPS logical hierarchy method. In the study of a think tank problem, DIIS process fusion method and MIPS logical hierarchy method are intertwined and iterative with each other.

We put forward the ten key issues regarding the use of think tank Double Helix Methodology. The ten key issues can also be regarded as ten research directions for the scientification of think tank. To address the issues, we need to use some specific tools and methods, which is the fourth layer or the specific method and tool layer. The think tank Double Helix Methodology is formed under problem orientation, evidence orientation, and science orientation, which is composed of an external cycle of decomposition–fusion– restoration and an internal cycle of interacting DIIS and MIPS. Considering the think tank Double Helix Methodology, we proposed the ten key issues: decomposition of think tank problem, scenario analysis driven by think tank problem, uncertainty analysis of think tank problem research, policy simulation analysis of think tank problem research, circulative iteration of think tank research, expert organization and management of think tank research, coupling relationship between DIIS and MIPS, combination of objective analysis and subjective judgment, human–machine combination think tank research support system, and think tank product quality management. The final part is the sets of methods and tools for addressing these issues.

To put it simple, the think tank Double Helix Methodology starts with the study of a problem and ends with solutions. It consists of four parts: the external cycle, the internal cycle, the ten key issues, and the methods and tools, being an exploration of think tank research paradigm. Such a complete

methodology makes it possible to integrate scientificity into the orientation, philosophy, process, and logic of think tank research.

BCAS: How can the think tank methodology achieve the crossing of social and natural sciences, integration of theory and practice, consultation as the basis, and provision of advice and suggestions? How can we establish Chinese method and Chinese school of thought?

PAN Jiaofeng: The fundamental purpose of science and technology development is to improve the interaction and adaptability of humans with the nature and to provide new means, new tools, new spaces, and new conditions for the development of the human society. In today's world, science and technology interact and integrate with the society, forming the trend of the socialization of science and technology and the scientification/technologization of the society. On the one hand, the development of science and technology provides the tools and opportunities for innovation and creation, making everyone a central node of innovation. Garage laboratory, maker space, and personalized manufacturing represent the deep socialization of science and technology. On the other hand, the society is highly technologized. The development of network, digital, and intelligent technologies has made the operation, governance, and development of the society greatly dependent on science and technology, creating a digital society and digital future on top of the real world. Accordingly, the objects of think tank research constitute an extremely complex system in which economic, social, and scientific and technological issues are interrelated, interconnected, and integrated.

Facing such complex research objects, think tank research is characterized by deep integration of natural and social sciences. Therefore, think tank research should be regarded as a science adopting interdisciplinary and systematic ideas and methods, which requires the integration of natural and social sciences. We should identify the natural and social science fields involved in the research problem and comprehensively consider the related problems to carry out integrated research for understanding the intrinsic regularity. We should attach importance to the crossing and fusion of natural and social sciences, and the connection of theory and practice, so as to provide solutions and policy suggestions to the problems for decision making.

Meanwhile, think tank research should pay special attention to the social phenomena associated with the issues in reality to achieve the integration of theory and practice in research. Finally, it is essential to restore the research problem to the issues concerned by policy makers and provide solutions for such issues.

The construction of new think tanks with Chinese characteristics does not have a long history and is developing from specialization to scientification. An important sign of scientification is the innovation of methodology. As China is at a new stage of development, think tank research is faced with many new requirements. To form Chinese solutions, we need to develop unique think tank methodology in the exploration and practice of addressing Chinese problems. Practice spawns demand, and demand drives think tank methodology innovation, which form Chinese method and school of think tank research.

BCAS: Discipline construction requires the support of theoretical system and methodology. Think tank construction has advanced from specialization, scientification to disciplinization and formed a discipline system. How to understand the profound connotation of this discipline system?

PAN Jiaofeng: Think tank has attracted widespread attention and played a role in the society since the construction of specialized think tanks. With the innovation of methodology to address think tank problems, think tanks have developed from specialization to scientification and are advancing towards disciplinization. One of the most distinctive features of disciplinization is the formation of a new discipline system, which is called think tank science and engineering.

The establishment of a new discipline in a specific research field is based on six factors: relatively mature research paradigm, theoretical method, academic system, scientific community, journal carrier, and talent training. The topics studied by think tanks are complex and comprehensive strategic, tactic, policy, management, and governance problems that involve multiple disciplines and fields. Therefore, we summarized the six characteristics—interdisciplinarity, interconnectedness, innovation, uncertainty, policy practicability, and social impact—of think tank research problems. These six characteristics are typical crossing and convergence problems. Addressing such problems with the ideas and methods used for solving general disciplinary and academic problems can provide only a glimpse but not the whole picture or only propose isolated and scattered suggestions based on the knowledge of a single discipline. How can we carry out research from a comprehensive point of view? Some researchers have carried out investigations, such as Professor Qian Xuesen's meta-synthesis system approach and Professor Hua Luogeng's optimization method and overall planning method, which are explorations and creations of related methods. This is also our original intention to develop the Double Helix Methodology of think tank research.

A frequently asked question is the disciplinary basis of think tank. Think tank researchers have different discipline

backgrounds which are all needed by think tank research. However, these disciplines cannot be regarded as think tank disciplines. In view of the characteristics of think tank research problems, we combine the research achievements of scholars worldwide including the think tank experts Qian Xuesen and Hua Luogeng with our own exploration and innovation and suggested that the discipline can be called think tank science and engineering, which includes five domains.

(1) The basic domain of think tank science and engineering refers to the construction of discipline concept, connotation, paradigm, theory, and methodology. For example, Qian Xuesen's meta-synthesis system approach, Hua Luogeng's optimization method and overall planning method, and the Double Helix Methodology we have been exploring and developing, are research achievements accumulated in this domain. In terms of the connotation of think tank research, think tank science and engineering actually considers think tank as a research field rather than just a research organization. The think tank Double Helix Methodology is actually paradigmatic. It addresses not a single issue but the general principles and rules that should be followed in think tank research. In this sense, it provides a methodology for the discipline of think tank science and engineering.

(2) The law domain of think tank science and engineering constitutes a branch of this discipline, which mainly refers to the key science, technology, and engineering issues of think tank. This is exemplified by the ten key issues—problem decomposition, scenario analysis, uncertainty analysis, policy simulation analysis, evidence-based circulative iteration, DIIS and MIPS coupling, combination of objective analysis and subjective judgment, expert organization and management, human–machine combination system, and product quality management—raised from the think tank Double Helix Methodology. In addition, this domain includes crossing studies and data-driven policy studies. The research on these issues contributes to the formation of some research branches and directions of think tank science and engineering and provides universal knowledge of laws or knowledge sources for methodological innovation.

Think tank engineering refers to the process of organized production of think tank products through think tank research and practice, which can be classified into large-, medium-, and small-scale think tank engineering projects. The large-scale think tank research projects we have worked on include the Strategic Research on Innovation 2050: Roadmap of Science and Technology, Strategic Research on Vision 2020: The Emerging Trends in Science & Technology and Strategic Option of China, Evaluation of Water Conservancy Projects, Research on Key Issues and Planning of Strategic and Emerging Industries during the 14th Five-Year Plan Period, Strategic Research on the Ten-Year Action Plan for Basic Research, Strategic Research on Science and Technology to Support the Western Ecological Barrier, Strategic Research on Regional Innovation System, and Strategic Research on High-quality Development of Inner Mongolia.

(3) The governance domain of think tank science and engineering also constitutes a branch of this discipline. It mainly refers to major economic, social, and scientific and technological governance issues and relevant fields such as development strategy, development planning, innovation as a driving force, global governance, national governance, social governance, and prediction and foresight. Because the think tank research involves multiple areas, multiple sub-problems converge to form a major problem domain. The gradual solving of the key sub-problems in the major problem domain can directly meet the needs of policy makers and form the branch research fields and directions of think tank science and engineering.

(4) The method and platform innovation domain of think tank science and engineering refers to the integration and innovation of discipline methods, models, technology platforms, and data resources. The examples include various qualitative methods, quantitative methods, mixed research methods, databases, expert databases, information databases, and macro-decision support systems developed by think tanks around the world.

(5) The knowledge dissemination domain of think tank science and engineering mainly includes the formation of the academic community, journal carrier, and institutionalized talent training system. CASISD has conducted a series of pioneering works in this area. In terms of talent training system construction, CASISD was granted with the project of Talent Training for High-end Science and Technology Think Tanks supported by the Ministry of Education in 2022 and became the first institution for fostering postgraduates in think tank theory and methodology in China. The University of Chinese Academy of Sciences has established the special direction of Think Tank Theory and Methodology and the corresponding curriculum under the first-level discipline of public management. This pioneered the construction of think tank discipline in China and promoted think tank research from scientification to disciplinization.

Looking backward, CASISD has taken a new road of high-end think tank construction from specialization to scientification and then to disciplinization. Looking forward, we should develop the theoretical and ideological methods of think tank science and engineering, which include the theory and method innovation for ten key issues such as scenario analysis, uncertainty analysis, iteration, and combination of subjective analysis and objective judgement. Moreover, we should develop the tools and research methods that reflect think tank engineering and adapt to different application scenarios and research fields. Examples include the method of roadmap construction of science and technology development for the research on the strategic planning of science and technology, the method of science and technology prospect and prediction for the research on major scientific issues worldwide, the method of matrix structure and event analysis for the organization of research on major issues worldwide,

the comprehensive evaluation methods of science and technology innovation for research on the development of regions, manufacturing industries, and high-tech industrial development zones, and the evaluation method of think tank journal group and report group for research on the journals and reports of think tanks. These mature research tools and methods have endowed CASISD with unique competitive advantages, constituted a complete set of knowledge system integrating social and natural sciences, theory and practice, and knowledge and action and advancing with the times. This is not only the basis of think tank research but also the key content of research and teaching of think tank science and engineering.

As for the current development of think tank, we should promote the establishment of the discipline of think tank science and engineering. The discipline formation and development of think tank science and engineering will provide theoretical and methodological support for think tank construction and also a knowledge system for the training of think tank talents. This will allow think tank to serve the modernization of national governance system and governance capacity, and make think tank an indispensable force to serve the progress of human civilization.

(Translated by ZHAO B)

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智库科学与工程：新型高端智库建设从专业化、科学化走向学科化

——潘教峰研究员访谈

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中国特色新型高端智库建设在党的十八大之后踏上“快车道”，正在进入高质量发展新阶段。中国特色的智库理论方法经历了怎样的发展过程？智库建设应如何从专业化、科学化走向学科化，并形成学科体系？对此，《中国科学院院刊》（以下简称《院刊》）专访了中国科学院科技战略咨询研究院（以下简称“战略咨询院”）院长潘教峰研究员。

《院刊》：中国新型高端智库建设已迈入高质量发展阶段，支撑高质量发展的关键核心是什么？

潘教峰：党的十八大以来，中国特色新型智库建设取得了快速发展，智库的作用和价值得到普遍认同，智库的活跃度、影响力日益显现，当前正在进入高质量发展新阶段，从数量扩张向内涵提升发展。

根据我长期参与到高端智库建设事业中的观察和分析，影响智库高质量发展主要有6个关键要素：一是有效的制度安排；二是顺畅的供需对接机制；三是专业化的智库机构和人才队伍；四是清晰、可操作的标准规范；五是科学的理论方法；六是广泛的国际链接。

（1）从有效的制度安排来看，中央已经把高端智库建设作为国家治理体系和治理能力现代化的一项制度性安排。随着高端智库建设试点工作的深入开展，一些探索性的做法和经验已经转化成卓有成效的制度建设。目前，整体上的制度供给能够支撑和满足智库高质量发展的需求。

（2）从顺畅的供需对接机制看，高端智库试点单位与中央和国家有关决策部门建立了常态化的直接对接机制，逐步探索形成了人才旋转门机制、任务直接

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交办机制、研究过程互动交流机制、信息资料共享机制、成果直接报送机制等。决策需求与咨询研究、对策研究有机衔接的机制初步形成。其他各类智库也在建立与决策咨询服务对象的对接机制上取得了积极成效，从机制上解决供需“两张皮”的脱节问题，能够更加有针对性地服务决策，从而提高智库成果质量。

（3）从专业化的智库机构和人才队伍来看，我国形成了以国家高端智库为引领，以专业化为特征，主体多元、类型多样、层次分明、各具特色的智库体系。有关智库机构的各类统计数据表明，我国专业化智库的数量已居世界前列，专职研究人员和专业化研究队伍建设不断发展壮大。兼具智库功能的研究机构、高等院校、社会组织和参与智库研究的专业研究人员数量更大，智库高质量发展的组织和人才基础日渐厚实。

（4）从清晰、可操作的标准规范来看，这方面还比较薄弱，从智库研究选题、研究过程、成果质量到人才评价都缺乏相应的价值导向和标准规范。以智库成果为例，需要更加明确智库提供的产品的性质、类型、特征，进而设定不同类型成果评价的标准。就智库所提供的决策咨询产品而言，可以分为4类：第一类是数据、知识型的产品；第二类是信息、实证或调研型的产品；第三类是思想观点类的产品；第四类是解决方案类的产品。从目前情况看，比较深刻的思想观点类产品还比较少，针对重大决策问题的系统性解决方案较为欠缺。智库真正意义上的价值应该是创新思想、指导实践，检验智库产品的“金标准”应该是能够提供智库问题的系统解决方案。

（5）从科学的理论方法来看，智库研究的对象是跨学科、多领域的综合复杂问题，以提供政策性的建议或解决方案为产出目标。其研究对象的复杂性和研究成果的实践性决定了智库理论方法的重要性。国内外很多知名智库都很重视针对研究问题创新研究方法，提高研究的科学性，发展出了多种定性、定量的研究方法。但总体而言，这些方法的工具性特征比较明显，缺乏系统性的视角，缺少方法论的创新，这与对智库研究规律的认识不足和智库理论体系的缺失是密切相关的。从专业化走向科学化，发展具有普遍适用性的智库理论方法及创新解决具体领域问题的方法工具，是提高智库研究质量和水平的必经路径，是许多智库面临的现实而紧迫的重大课题，也将成为中国新型高端智库建设过程中产出的重大理论贡献。

（6）从广泛的国际链接来看，智库考虑的问题、提出的解决方案，应当是对促进全球发展有价值和意义的，必须要有全球视野，能够聚集全球智慧。国际化是智库本身所具有的特征，所以每个智库都应该有广泛的国际链接。在世界处于百年未有之大变局的当下，世界向何处去，如何解决人类共同面临的重大挑战和问题，构建人类命运共同体，更加迫切需要发挥智库的桥梁、纽带、网络作用，加强国际交流合作，共同提出有益于世界发展、人民富裕、文明进步的解决方案。

《院刊》：智库建设过程中，如何将问题导向、证据导向与科学导向纳入智库研究过程中？

潘教峰：智库研究首先要问题切入。问题导向讲的是要真正聚焦研究问题，厘清决策真需求，研究真问题，深入理解研究的问题和对象。① 要理解清楚研究问题的类型。比如，面对的智库问题是战略问题、策略问题、管理问题，或是政策问题。不同类型的问题最后形成的解决方案或建议各有侧重，有很大差异。② 要理解这些问题涉及的学科和领域。明确了问题域之后，才能进一步解析问题，提炼问题的关键要素，构建分析框架，将研究问题降维分解成单一学科或领域、研究者利用已有知识基础能够把握、又相互有机联系的子问题集。③ 通过问题解析，才能找到相关领域的专家，找到可供使用的研究成果和已有共识

的研究结论，充分用好已有的研究积累和知识基础。④ 确定利益相关方。只有找到利益相关方，才能在研究过程中综合考虑不同利益相关方的利益考量，进行博弈和模拟，使提出的建议能够兼顾、平衡各方利益诉求。

证据导向展现了智库研究的循证过程，也体现了智库的客观性和独立性。智库研究问题难以完全定量化，有时候只能给出一种定性的判断。做定性判断，就要找证据，什么样的客观事实能够支撑这样的判断。同时，定量的数据和证据支持增强了研究结论的科学性、可靠性、可行性，有利于获得决策者、利益相关方和社会公众的理解和认同。通过证据导向，真正把客观性导入到研究过程中。

科学导向强调智库研究中贯穿了科学的态度、科学的方法、科学的实践。智库提出的政策建议一旦被决策者采纳，就会产生广泛而深刻的社会影响，所以形成的建议应当慎之又慎，在研究过程中要有严谨、科学、负责任的态度。在科学导向中，解决不同问题要尽量采取与之相适应的科学方法，充分用好已有的知识基础和经验积累，不断循证和验证，将问题导向、证据导向、科学导向纳入整个智库研究的过程中，切实提高研究质量。

《院刊》：您提出的智库理论方法从DIIS（Data-Information-Intelligence-Solution）到DIIS-MIPS（Mechanism analysis-Impact analysis-Policy analysis-Solution）双螺旋再到“四个层次”，经历了怎样的实践探索、逻辑演进及理论迭代?

潘教峰：2007 年，中国科学院组织了“中国面向 2050 年科技发展路线图”的战略研究。在研究的过程中，我们非常重视方法选择和整体的组织实施，选取了路线图的方法，把需求、目标、任务、关键的科学技术问题、实现路径及保障措施有机连接起来。经过两年的研究，形成了一套很有影响力的战略报告《创新 2050：科学技术与中国的未来》，充分展示了研究的系统性、科学性、战略性、预见性，也影响到之后的一系列战略研究，包括 2013 年组织的“科技发展新态势与面向 2020 年的战略选择”战略研究，也是采用了这样的思路和方法。

2016 年以来，我们参与到国家高端智库试点建设中，更是遇到了大量综合性、复杂的、涉及经济社会各个方面的决策咨询问题。结合已有的科技发展战略研究基础，在新的研究实践中总结经验，提炼归纳智库问题研究的必要、规范的过程，提出了在问题导向、证据导向、科学导向下的 DIIS 理论方法。DIIS 理论方法不是简单地从数据出发，而是在3 个导向指导下，从收集数据（data）到揭示信息（information），到综合研判（intelligence）再到形成解决方案（solution），把研究的规范建立起来，把系统思维、循证思维贯通到智库研究各环节和全过程，所以，我们把 DIIS 理论方法称之为“DIIS过程融合法”。实践证明 DIIS 理论方法对于智库研究质量的提高，起到了很好的作用。

在这个基础之上，我们又进一步认识到，智库研究的逻辑和内涵涉及机理问题、影响问题和政策问题。

任何一个智库问题从研究问题对象来分解的话，是一个复杂、综合性的问题，涉及不同学科、不同领域，这就需要研究它们相互之间作用的规律，我们称之为智库问题的“机理研究”（mechanism analysis）。

在对问题的本质机理的研究基础之上，我们就要看这个问题对于经济、社会、科技、人文、环境等各个方面的影响，进行“影响分析”（impact analysis）。客观认识影响的程度、范围有助于确定所面对的问题的决策价值和重要性。

之后要进行“政策性分析”（policy analysis），已有哪些相关政策？政策作用效果如何，是正效应还

是负效应？解决这样的问题，又需要什么样的新政策（solution）？新政策输入之后，又会带来什么样的影响和效果？

智库问题在研究中必然涉及机理问题、影响问题或政策问题，需要进行这几个方面的分析，并不断收敛迭代，这就是 MIPS 逻辑层次法。在智库问题研究中，DIIS 过程融合法和 MIPS 逻辑层次法也是相互交织、互相迭代的。

我们围绕如何运用智库双螺旋法，提出了智库双螺旋法的“十个关键问题”，这“十个关键问题”也可以视作智库科学化发展的 10 个研究方向。在解决智库问题的实践中，又要用到具体的一些工具、方法，这就是所谓第四个层次，即具体的方法工具层。这就构成了智库双螺旋法在问题导向、证据导向、科学导向下，从“解析—融合—还原”的外循环到 DIIS 过程融合法和 MIPS 逻辑层次法相互交织内循环的过程；再到智库问题的解析、智库问题牵引下的情景分析、智库问题研究的不确定性分析、智库问题研究的政策模拟分析、智库研究的循环迭代、智库研究的专家组织与管理、DIIS 与 MIPS 的耦合关系、客观分析与主观判断的结合、人机结合的智库问题研究支持系统、智库产品质量管理等“十个关键问题”；进而到解决问题的方法箱和工具集。

简单地说，智库双螺旋法始于研究问题，终于解决方案，由外循环、内循环、“十个关键问题”和方法工具层 4 个部分构成，是对智库研究范式的探索。这样一个完整的研究方法体系，使得其将科学性贯通到智库问题的研究导向、研究哲学、研究过程、研究逻辑之中。

《院刊》：智库的理论方法研究怎样更好地实现文理交叉、理实融通、咨政为本、建言献策？如何形成中国方法、中国学派？

潘教峰：科技发展的根本目的，是使人类与整个自然的相互关系和适应性变得更好，并为人类社会发展提供新手段、新工具，创造新空间、新条件。当今世界，科技与社会相互影响构建，加速融合，形成了科技社会化、社会科技化的发展态势。一方面，科技的发展赋予人们创新创造的工具和机会，使每个人成为创新的中心节点。车库实验室、众创空间、个性化制造都代表了科技深度社会化的趋势。另一方面，社会也高度地科技化。网络化、数字化、智能化的科技发展使得社会的运行、治理、发展都极大地依赖于科技，乃至在真实世界之上建构出一个数字社会、数字未来。由此，智库研究所面对的对象构成了一个极其复杂的系统，经济、社会、科技问题相互联系、相互贯通、相互融合。

面对这样复杂的研究对象，智库研究问题必然是一个自然科学、社会科学高度交叉的问题。因此，更应该把智库研究视为一门科学，采用跨学科、系统性的思维和方法，这就要求智库研究要做好文理交叉。针对研究的问题，识别到底涉及哪些自然科学领域、社会科学领域，把相关联的问题组合在一起进行交叉融合研究，从而把握其内在的规律性。我们要重视自然科学、社会科学的交叉融合研究，要重视贯通理论和实践，面对决策研究的问题形成解决方案，更好地咨政建言。

同时，智库研究要特别重视现实中和问题相关联的那些社会现象，做到理论和实际的有效贯通和融合，也就是在研究中要做到理实融通。最后要把研究的问题回归到决策者关心的问题上，围绕着决策者关心的问题提出解决方案。

中国特色新型智库建设尽管时间还不长，也正在从专业化向科学化方向发展。科学化的一个重要标志就是开始重视理论方法的创新。当前，我国进入到新发展阶段，智库研究问题面临很多新的要求。要形成中国的解决方案，就需要在解决中国问题的探索实践中形成独具特色的智库理论方法。实践催生需求，需

求牵引带动智库理论和方法的创新，从而形成智库研究的中国方法和中国学派。

《院刊》：学科建设需要理论体系与方法论的支撑，智库建设从专业化、科学化走向学科化，并形成学科体系，应如何理解这一学科体系的深刻内涵？

潘教峰：智库真正引起全社会的广泛关注、发挥作用是从专业化智库建设开始的。随着解决智库问题本身的理论方法创新，智库在从专业化走向科学化。今天，正在向学科化方向发展。学科化方向发展的一个最鲜明的特征就是形成一个新的学科体系，这个学科我称之为“智库科学与工程”。

当某个研究领域具备了相对完整的研究范式、理论方法、学术体系、科学共同体、期刊载体、人才培养这六大条件，可以判断一个新学科的形成。就智库而言，智库研究的问题是涉及多学科交叉、跨领域融合的复杂、综合的战略问题、策略问题、政策问题、管理问题、治理问题，我们归纳了智库研究问题的六性特征——学科交叉性、相互关联性、创新性、不确定性、政策实用性、社会影响性，是典型的交叉会聚问题。解决这类问题，用解决一般学科问题、学术问题的思路、方法，显然只能窥一斑而不能知全貌，或者一鳞半爪、剑走偏锋，从单一学科知识背景提出点上的、零散的建议。如何从系统的、综合的角度开展研究？已有学者开展了积极探索，钱学森先生的综合集成法、华罗庚先生的“双法”（优选法、统筹法），都是这样的开拓和创造。我们发展智库理论方法，提出智库双螺旋法的初心也是源于此。

经常有人问，智库的学科基础是什么？从事智库研究的专业人员都有各自不同的学科背景，这些学科都是智库研究所需要的，但显然还不能说这些学科是智库学科。针对智库研究问题的特征，综合国内外同行，钱学森先生、华罗庚先生等智库大家的研究成果和我们自己的探索创新，我认为，我们的学科应当是智库科学与工程，包括5个层次。

（1）智库科学与工程的基本问题域，主要是指学科概念、内涵、范式、理论、方法论的构建，如钱学森综合集成方法论，华罗庚“双法”思想，我们正在探索发展的智库双螺旋法理论等都是这方面的研究成果和积累。从智库研究的内涵来看，智库科学与工程实际上是把智库视为一个研究领域，而不仅仅是一个研究组织。智库双螺旋法实际上是带有一种范式特征，它解决的不是单一的一个问题，而是解决了智库研究普遍应当遵循的原则和规则，从这个意义上，它也为智库科学与工程这一学科提供了方法论。

（2）智库科学与工程的规律问题域，可以构成智库科学与工程的学科分支，主要是指智库关键的科学、技术、工程问题。如智库双螺旋法提出的“十个关键问题”：情景分析、不确定性分析、博弈分析、循证迭代分析、政策模拟分析、DIIS与MIPS耦合、主观与客观结合、人机结合研究系统、专家组织与管理、产品质量管理等；此外还有交叉融合研究、数据驱动的政策研究等都属于这一范畴等。通过这些问题的研究，可以形成智库科学与工程的一些研究分支领域和方向，提供带有普遍性的规律认知，或为方法创新提供知识源头。

智库工程是指通过智库研究实践活动，有组织地生产智库产品的过程，可分为大规模、中规模、小规模的智库工程。我们先后承担的大规模智库工程包括：创新2050科技路线图战略研究、科技新态势与面向2020战略选择战略研究、水利工程评估、“十四五”战略性新兴产业重点问题研究与规划研究、基础研究十年行动方案战略研究、科技支撑西部生态屏障战略研究、区域创新体系战略研究、内蒙古高质量发展战略研究等。

（3）智库科学与工程的治理问题域，也构成智库科学与工程的学科分支，主要是指重大的经济、

社会、科技治理问题及其所形成的领域分支，如发展战略学、发展规划学、创新驱动、全球治理、国家治理、社会治理、预测预见等。因为智库涉及的领域是多方面的，多个子问题可以汇聚构成一个重大的问题域。而这些重大问题域中关键问题的逐步解决可以直接满足决策者的需求，并形成智库科学与工程的研究分支领域和方向。

（4）智库科学与工程的方法平台创新域，是指学科方法、模型、技术平台、数据资源的整合创新，如世界各国智库发展的各类定性方法、定量方法、混合研究方法，数据库、专家库、情报库，宏观决策支持系统等。

（5）智库科学与工程的知识传播域，主要包含学术共同体、期刊载体、建制化人才培养体系的形成。在这方面战略咨询院做了一系列开拓性的工作。在人才培养体系建设方面，2022年战略咨询院获教育部批准“高端科技智库人才培养”专项，成为全国首家智库理论与方法方向的研究生培养单位。在中国科学院大学“公共管理”一级学科下设置“智库理论与方法”特色方向和相应课程体系，开拓了国内智库专业建设的先河，切实推进智库研究从科学化向学科化迈进。

回顾过去，战略咨询院从专业化到科学化再到学科化，走出了一条新型高端智库建设之路。展望未来，我们要发展智库科学与工程，不仅要发展智库科学与工程的理论方法、思想方法，包括情景分析、不确定性分析、循环迭代、主观与客观结合等“十个关键问题”的理论与方法创新。还要发展体现智库工程的工具方法、研究方法，创造和发展适应不同应用场景、研究不同领域问题的工具方法。如用于科技战略规划研究的“科技发展路线图研制方法”、用于国内外重大科学问题研究的“科技前瞻与预测方法”、用于组织国内外重大问题研究的“矩阵结构与事理分析方法”、用于考察区域和制造业及高新区发展的“科技创新综合评价方法”、用于考察智库期刊和报告的“智库期刊群、报告群评价方法”等。这些成熟的工具方法和研究方法已经形成战略咨询院独特的竞争力优势，构成一整套文理交叉、理实融通、知行合一、与时俱进的知识体系，这既是我们开展智库研究的基础，也是开展智库科学与工程研究与教学的关键内容。

智库发展到了今天，应当推动智库科学与工程学科的建立。通过智库科学与工程的学科形成和发展，一方面，为智库建设提供理论支撑、方法论支撑；另一方面，为智库人才培养提供知识体系，使智库真正成为有力服务国家治理体系和治理能力现代化，服务人类文明进步的一支不可或缺的重要力量。

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