

# Research on Precise Transformation Mechanism and Method of Scientific and Technological Achievements Based on Data Driven

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## Abstract

*The transformation of scientific and technological achievements is the chain integration, dynamic adaptation, accurate matching and organization scheduling of scientific and technological achievements supply and technological demand data. How to use a large number of scientific and technological achievements and technical demand data information to realize the accurate transformation of scientific and technological achievements is an urgent problem to be solved by many scientific and technological achievement transformation service platforms. Firstly, this paper defines the value function and practical challenges of data-driven accurate transformation of scientific and technological achievements, and analyzes the whole process of "data collection and classification - data analysis and mining - data sharing and push - data decision-making and innovation" from the whole life cycle of data transformation of scientific and technological achievements, The implementation path of accurate transformation of scientific and technological achievements based on data-driven and the matching method between scientific and technological achievements and technical requirements based on text similarity are proposed.*

**Keywords:** *transformation of scientific and technological achievements; data-driven; accurate transformation; text similarity*

## I. Introduction

Data driven, value reconstruction and agile innovation are the inevitable products of the integration of digital infrastructure and industrial informatization, internationalization, intelligence and digital urbanization. As the demand for scientific and technological innovation of enterprises shows an explosive growth trend, it is of great significance to solve the problem of accurate matching between sea volume scientific and technological demand and scientific and technological achievements in the service platform for the transformation of scientific and technological achievements, improve the adhesion between scientific and technological supply and industrial demand, and promote the virtuous cycle of scientific and technological innovation and high-quality development of regional economy. The transformation of scientific and technological achievements takes the advanced and applicable scientific and technological achievements as the starting point and the commercialization and industrialization of scientific and technological achievements as the symbol. It is not only the process of producing valuable achievements, but also the process of realizing the value of achievements. The data-driven transformation mechanism of scientific and technological achievements can enrich the quantity of data resources for the transformation of scientific and technological achievements, optimize the transformation process and quality of scientific and technological achievements, save the management cost of data resources for the transformation of scientific and technological achievements, provide accurate services for the transformation of scientific and technological achievements, meet the needs of users for the transformation of scientific and technological achievements, and drive and manage the knowledge flow and material flow with the data flow of scientific and technological achievements, Realize accurate identification, accurate push, accurate feedback and accurate decision-making of scientific and technological achievements. Through the accurate docking of participants in the transformation of scientific and technological achievements, the data flow, knowledge flow and innovation flow formed by scientific and technological innovation, achievement transformation and industrialization can accelerate

and drive the realization of the value of scientific and technological achievements. Based on the accurate transformation of scientific and technological achievements driven by data, the knowledge flow, capital flow and talent flow are guided and driven by data flow, so as to effectively promote the matching of supply to demand, connect the personalized and customized needs of suppliers and demanders, and integrate the high-quality supply of scientific and technological achievements with effective demand.

## II. Literature Review

Bouroche pointed out that the transformation of scientific and technological achievements should achieve a "win-win situation" in the industry-university-research cooperation mechanism.[1] American Austrian economist Schumpeter proposed in 1912 that technological innovation was the main driving force for economic development,[2] and Davies analyzed the potential benefits of school-enterprise cooperation, George studied the empirical alliances of 147 biotechnological enterprises.[3] Loet Leydesdorff discusses the EU's technology transfer system from innovation theory to regions, sectors, branches, clusters, etc., as classified interpretations of the analysis of non-market selection environments.[4] J.Lee and H.N.Win focused on technology transfer activities between the University of Singapore and Industry, and made a detailed analysis and comparison of technology transfer activities at a university research centre in Singapore.[5] The research found that a research center was engaged in technology transfer activities, and the participation of industrial enterprises was a very important factor. The deeper industrial enterprises participate in technology transfer, the better the effect of technology transfer. In his investigation of the role of the Israeli Technology Transfer Agency, Arnold Reisman stressed that the technology transfer activities between Israeli research institutes and enterprises mainly learn from the American model.[6] Combined with the practical experience of the transformation of scientific and technological achievements in China, Chinese scholars have made some progress in theoretical research and practical exploration. Wu Jun and others have established a difficult game model for the transformation of scientific and technological achievements, explaining the inefficiency of non-cooperation and the possibility and necessity of cooperation,[7] and providing a basis for the construction of the industrialization mechanism of scientific and technological achievements. Dong Shuli analyzed the innovation system and mechanism of the Research Institute of Shenzhen Tsinghua University, established a science and technology business incubator mechanism that integrates technology, capital, talent and other functions, and effectively promoted the industrialization of scientific and technological achievements[8] Zhang Sheng and others put forward the strategy to break through the obstacles to the transformation of scientific and technological achievements, and build the transformation mechanism of scientific and technological achievements led by scientific and technological personnel.[9] Wu Jinhong pointed out that "in the current era of big data, enterprises' decisions no longer rely on experience and intuition, but also more the analysis of data".[10] There is no significant regional difference in the efficiency of science and technology resource allocation in China, showing a balanced development pattern.[11]

Through literature combing, it is not difficult to find that the previous research on the transformation mechanism of scientific and technological achievements mainly focuses on the transformation mode innovation of scientific and technological achievements. The existing research mainly analyzes the internal and external factors affecting the transformation of scientific and technological achievements, discusses the connotation, action mechanism and improvement suggestions of the transformation mechanism of scientific and technological achievements from multiple dimensions, and provides theoretical basis and decision-making reference for innovating the incentive mechanism, optimizing the transformation mode of scientific and technological achievements, and improving the performance of the transformation of scientific and technological achievements. Although some scholars on the big data era of scientific and technological achievements transformation precision mechanism[12] and scientific research management information countermeasures[13] have carried on the preliminary research, relatively lack of scientific and technological achievements transformation data of the whole life cycle model research, especially how to focus on the scientific and technological achievements supply and demand efficient docking, build the precise transformation mechanism of scientific and technological achievements thorough research is not much. Based on this, this paper on the whole process, industrial chain, value chain mechanism, clear the connotation of scientific and

technological achievements transformation mechanism, reveals the essence of the precise transformation of scientific and technological achievements mechanism, namely by enterprise science and technology demand as traction, relying on wisdom science and technology service platform, build data collection, analysis, mining, push, technology, sharing and application mechanism, put forward the implementation path of the mechanism and the method of scientific and technological achievements.

### **III. The value and challenge of precise transformation of scientific and technological achievements**

#### **3.1 Value function of precise transformation of scientific and technological achievements**

The precise transformation mechanism of scientific and technological achievements is based on data-driven scientific and technological resources organization and scheduling, based on consistent supply and demand management, and data sharing and value realization, which reflects the initiative and precision of the management service of scientific and technological achievements transformation, which is conducive to fully mobilize the enthusiasm, creativity and initiative of the participating subjects.

##### **3.1.1 Avoids the multi-head connection and blind connection between supply and demand, and gives full play to the professional advantages of researchers**

As the main force of scientific and technological innovation and an important supplier of scientific and technological achievements, universities have complete disciplines and majors, the scale and structure of scientific and technological personnel are relatively reasonable, the scientific and technological input and achievement output are relatively stable within a unit of time, and the research expertise, research fields and direction of research researchers are relatively focused. And enterprises are keen to the technology demand of the market, and have advantages in the landing of technology and the efficiency of technology marketization. Enterprises expect that the time of research should be fast and short, pay attention to economic returns, and have their own evaluation system for scientific and technological achievements.[14] Therefore, the transfer areas and enterprises of scientific and technological achievements are relatively stable. On the other hand, although the enterprise has different development stages and different scientific and technological needs, they all show certain continuity and integrity, and the correlation with the main business of the enterprise, with both common research and development needs and professional research needs. In addition, the geographical distance between universities and scientific research institutions and enterprises, the communication problems between important participants, and the local policy problems may all lead to the failure of industry-university-research cooperation. Therefore, through the introduction of big data and Internet technology, each innovation subject is introduced into the same platform to deepen mutual understanding, close contact and enhance communication, the government will provide some support measures according to the specific needs of all parties, and the probability of successful cooperation will be effectively improved.[15]

**3.1.2 Takes the initiative to accurately connect with the information on scientific and technological innovation and scientific and technological needs, and improve the transformation rate of scientific and technological achievements**  
An important reason for the long-term low efficiency of the transformation of scientific and technological achievements lies in the separation of research and development and production, and the institutional mechanism of "research and development first, then transformation, then application and promotion" leads to a large number of research and development achievements that are not suitable for the transformation in terms of technical characteristics.[16] According to the 2019 China Patent Survey Report, there is still much room for improving the application of patents in universities and scientific research units, and information asymmetry is the main factor restricting the effective implementation of patent rights [17] Therefore, it is necessary to give full play to the low cost of data acquisition, contains high value, fast flow advantages, to the supply and demand data of scientific and technological achievements as the guide, from the source of enterprise scientific and technological achievements supply data, break the traditional transformation process, improve the foresight of supply and demand docking, effectively solve the problem of university research and market demand. For example, for example, can through the construction of colleges and enterprise scientific and technological achievements accurate transformation mechanism, the enterprise technology research, talent training, management consulting demand into can be made use of enterprise

science and technology demand database, using accurate portrait technology for college science and technology innovation project research dynamics, scientific and technological talent innovation ability visualization processing and present, using accurate matching technology "point-to-point" docking.

### 3.1.3 Aggregates scientific and technological innovation resources and improves the refined level of management service for the transformation of scientific and technological achievements

Fine management here refers to the implementation of standardized detailed management of the whole process of the transformation of scientific and technological achievements, and all management responsibilities are implemented to the specific implementers, so as to balance the rights and interests of all stakeholders, and improve the performance of the transfer and transformation of scientific and technological achievements.[18] Therefore, the construction of a mechanism for the precise transformation of scientific and technological achievements is conducive to improving the coordination ability and operation efficiency of scientific and technological innovation and achievement transformation. From the perspective of the internal procedures of the transformation of scientific and technological achievements, the transformation of scientific and technological achievements involves university disclosure of scientific and technological achievements, patent application evaluation, value evaluation of the transformation of scientific and technological achievements investment and financing value analysis, technology transfer performance evaluation, transformation conditions of scientific and technological achievements, pilot base construction, and the potential transfer area, transfer object analysis and other complete business process. The data correlation of the above links is strong and has high application value. It is difficult for the traditional manual analysis and operation mode to effectively deal with the massive heterogeneous data generated in the business process, which inevitably leads to repetitive and inefficient labor, and the value of the data is difficult to be deeply explored and timely shared. We will build a mechanism for the precise transformation of scientific and technological achievements, aggregate scientific and technological innovation resources and promote the sharing of scientific and technological resources, form a data-based management model for the transformation of scientific and technological achievements, and fundamentally improve the transformation rate of scientific and technological achievements.

### 3.1.4 Makes overall use of scientific and technological innovation resources inside and outside the school to promote the coordinated development of regional innovation resources

An important feature of regional innovation and development is that the industrial agglomeration degree is increasing, and the regional distribution of scientific and technological innovation resources is unbalanced. Because there may be a knowledge gap between the donors and receptors of the transfer and transformation of scientific and technological achievements, we need to consider the impact of the knowledge distance on the transformation path of scientific and technological achievements.[19] The development of mobile communication technology eliminates the physical distance between the transformation of scientific and technological achievements, and is conducive to coordinating scientific and technological resources service enterprises in a larger range, "catch all" the scientific and technological achievements of colleges and universities, "calling" the scientific and technological personnel of colleges and universities, and realizing the effect of mastering the scientific and technological resources of colleges and universities "without leaving home". Therefore, it can make overall use of the scientific and technological innovation resources of universities inside and outside the region to realize the national and even global optimization of regional scientific and technological innovation resources, and solve the contradiction of insufficient scientific and technological innovation resources in the region. Build a precise docking mechanism between universities and regions and enterprises, and universities can integrate the needs of regional science and technological innovation with universities through the analysis of regional innovation hot spots. With the help of the mobile Internet and other information means, better realizing information communication between science and technology and enterprises can not only solve the problem of unimpeded supply and demand connection between schools and enterprises, but also eliminate the problem of unbalanced distribution of regional scientific and technological resources, and coordinate a wider range of scientific and technological innovation resources to achieve the coordinated development of regional economy.

## 3.2 Practical challenges of the accurate transformation of scientific and technological achievements

In the past, the transformation of scientific and technological achievements was mostly a passive service of "waiting": when scientific and technological personnel disclose scientific and technological achievements, it is difficult to evaluate and judge the value, and do not decide whether scientific and technological achievements apply for intellectual property rights. Lack of active planning and layout for the scientific and technological needs of enterprises, most scientific and technological personnel are "carry the bag" innovation. Therefore, the lack of precision and coordination of scientific and technological innovation organization and management is specifically reflected in the following aspects.

### 3.2.1 The application atmosphere of accurate transformation data of scientific and technological achievements is not strong

With the development of R & D technology, new scientific research data and information will be generated continuously. This data and information is used by many companies as a source of knowledge in their business areas.[20] At present, the data management of the transformation of scientific and technological achievements in China is still in the exploratory stage. The data awareness of the transformation of scientific and technological achievements is not strong, the concept of data life cycle management is weak, and the data of scientific and technological achievements is not planned and managed as a key asset, resulting in the basically idle data of the transformation of scientific and technological achievements. The value of scientific and technological achievements transformation data can not be effectively brought into play. Local governments at all levels do not have strong willingness to carry out online docking activities of scientific and technological achievements. Although there are many docking activities of scientific and technological achievements, most of them focus on on-site docking. The built scientific and technological service platform has few online docking activities and low utilization rate. The enthusiasm of enterprises to carry out scientific and technological innovation by using the scientific and technological service platform also needs to be improved.

### 3.2.2 The data management level of the precise transformation platform of scientific and technological achievements is not high

There is often a lack of mutual trust and normalized docking mechanism between universities and enterprises. On the one hand, universities do not actively collect, analyze and master the scientific and technological needs of enterprises, and rarely consider the scientific and technological needs of enterprises in carrying out scientific and technological innovation; On the other hand, the channels for enterprises to understand scientific and technological achievements are not unblocked, so it is difficult to grasp the data of scientific and technological achievements in time and accurately. The analysis, evaluation, identification and management system of scientific and technological achievements is not perfect, and the evaluation system such as the technical maturity of scientific and technological innovation achievements is missing. In addition, the transformation data of scientific and technological achievements are mostly original data, scattered in different departments, and the value density is low. Enterprises are easy to fall into the fog of scientific and technological achievement data. In addition, the decision-making of scientific and technological achievements transformation is mainly based on the judgment of scientific and technological personnel. Most of the management departments of scientific and technological achievements transformation only assist in the auxiliary work such as contract sealing and business reception, and rarely actively participate in the value judgment of scientific and technological achievements, Market Research and enterprise docking.

### 3.2.3 The precise transformation and docking service platform of scientific and technological achievements is not powerful

The deployment of the platform presents such phenomena as fragmentation, repeated construction, low resource sharing and difficulty in maintaining normal operation.[21] The reasons mainly include the following factors: first, the existing science and technology service platform has no access threshold, lack of science and technology demand identification and analysis mechanism and science and technology enterprise certification management system, so it is difficult for science and technology enterprises to effectively report science and technology demand, and the massive science and technology demand is too abstract and principled, so that no one cares; Second, the operation mode of scientific and technological achievement service platform is unreasonable. Most of the existing scientific and technological service platforms are dominated by the government or operated by social intermediaries entrusted

by the government. They are public welfare service platforms with strong universality and poor professionalism, often resulting in the "tragedy of the commons" of scientific and technological services. In addition, the user experience of the science and technology service platform is not good enough. Most scientific and technological achievements are displayed in the form of text and pictures. The data form is relatively single, and there is a lack of in-depth analysis such as process principle.

#### IV. Analysis on the transformation process of scientific and technological achievements based on data driven

In the whole life cycle of data collection, storage, mining and use of scientific and technological achievements, it involves data providers, data managers, data users, etc. Colleges and universities are not only data collectors, managers, and enterprises, governments, technology transfer institutions and investment and financing institutions, they are also users of data. From the life cycle of the transformation of scientific and technological achievements, the transformation process of scientific and technological achievements corresponds to the process of "Collection and Analysis of Scientific and Technological Achievements Disclosure Report-Scientific and Technological

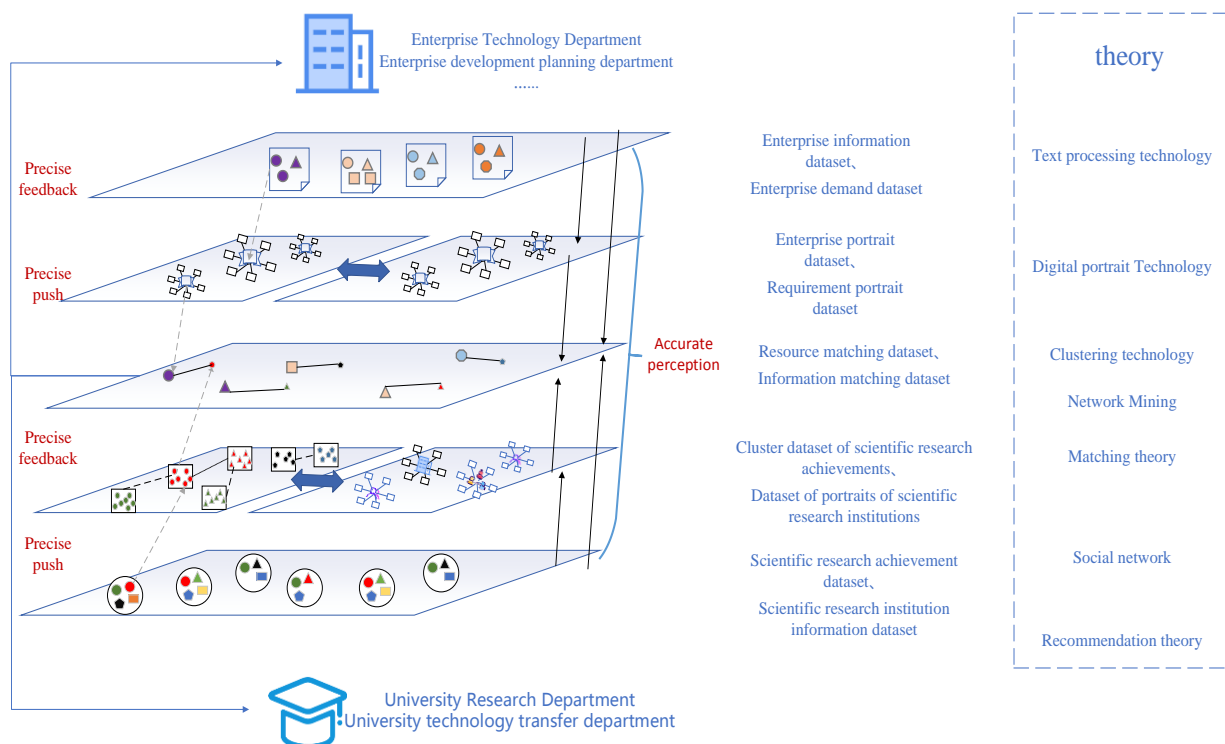


Fig 1: The process of data-driven transformation of scientific and technological achievements

Achievements to accurately push the evaluation and feedback of "scientific and technological achievements", as shown in Figure 1 below. The data-driven transformation process of scientific and technological achievements in colleges and universities should be value-oriented by serving users. Through the horizontal and vertical link interconnection and information sharing of the unified platform, the scale and value of technological resource utilization and analysis dimensions are maximized, so as to provide customized services and on-demand distribution to users in each link.

##### 4.1 Data collection and classification

The collection and classification of data are the logical starting point of the whole life cycle management of the transformation of scientific and technological achievements. In a sense, the comprehensiveness, objectivity and convenience of data collection determine the smooth operation of the precise transformation mechanism of scientific

and technological achievements. In practice, the asymmetry between technology supply and demand information and the mismatch between supply and demand are the problems often encountered in the process of the transfer and transformation of scientific and technological achievements. How to get through the "last kilometer" in the process of achievement transformation is an urgent subject for the transformation of scientific and technological achievements.[22] The transfer and transformation of scientific and technological achievements usually involves suppliers (universities, institutes, R & D enterprise -knowledge providers) and receptors (enterprise-knowledge receiver)[23]. Therefore, the data collection of the transformation of scientific and technological achievements includes not only the donor data, but also the demand data of the receptors, and the government policies, the business environment and other data. Among them, the scientific and technological needs of receptors are the starting point of the donors of scientific and technological achievements, which affects and determines the direction of scientific and technological innovation. Based on this, in the data collection and classification stage, while mastering the basic data of intellectual property rights and other scientific and technological achievements, we should expand and collect the raw data of scientific and technological personnel, scientific research papers and scientific research projects, actively collect and grasp the data of scientific and technological needs of regional and enterprises, and serve as the data basis for knowledge transfer, transformation, application and innovation

#### 4.2 Data analysis and mining

The essence of the data analysis and mining of the transformation of scientific and technological achievements is to transform the potential and original data into visual and high-value data, give insight into the scientific and technological needs of enterprises, and present the scientific and technological innovation ability and regional scientific and technological innovation hotspots in a three-dimensional way. For example, the transformation of scientific and technological achievements of Tsinghua University is to establish a comprehensive patent service system around the "key talents, key projects and key achievements", highlighting the key types of the key patent application, ranking of top five inventors, introduction of key patent technologies. In the process of data analysis and mining, there are often two kinds of mining ideas: individual mining and group mining. Individual mining is mining from the data of the entity itself, depicting the nature of the entity and exploring the extension characteristics; group mining is to find the user nature and extension characteristics of the entity from the data of a large number of similar entities.[24] Through the correlation analysis, user portrait technology and cluster analysis of transformation elements of scientific and technological achievements, technological achievements, intellectual property, papers and transferred scientific and technological needs, useful scientific and technological achievements information is extracted from complex data to provide core data for the accurate display of scientific and technological achievements.

#### 4.3 Data push and sharing

From the perspective of data push and sharing process, the transformation of scientific and technological achievements internally serves the transformation of scientific and technological achievements, and externally serves enterprise scientific and technological innovation, government science and technology management and decision-making, and technology transfer institutions for the promotion and dissemination of scientific and technological achievements. Therefore, only by accurately pushing and sharing the transformation data of scientific and technological achievements from technicians, enterprises and other users according to the demand, can we maximize the value of the transformation data of college scientific and technological achievements. Scientific research data is analyzed and excavated and matched between the two parties, and then serves the government functional departments, college scientific and technological achievements transformation management institutions, enterprises, investment and financing institutions, intellectual property operation institutions, industry associations and public decision consultation through data sharing or accurate push. Data push and sharing follow the principle of "sales funnel" and gradually narrow the push scope according to "potential customers". Those who are not willing to feedback and push information will be regarded as invalid users, and the data push and sharing are terminated. Continue to pay attention to and key contact with users with active data feedback and real and effective scientific and technological demand

data, so as to enhance the loyalty of data push and sharing of scientific and technological achievements.

#### 4.4 Data decision-making and application

The use of data for scientific decision-making is the key to the realization of data value in the transformation of scientific and technological achievements, and also the core of the mechanism for the precise transformation of scientific and technological achievements. Users of data for the transformation of scientific and technological achievements mainly include universities, enterprises, government functional departments, investment and financing institutions, and technology transfer agencies and other social intermediary service institutions. Only by combining the characteristics of data users for the transformation of scientific and technological achievements and providing data according to personalized needs can we ensure the maximum benefit of data application for the transformation of scientific and technological achievements. For example, universities can use scientific research data to innovate management methods and optimize scientific and technological management decisions. According to the research ability of universities and institutes and project research and development progress, enterprises give timely feedback on scientific and technological needs, and promote scientific and technological cooperation and transformation of achievements. Investment and financing institutions may, according to the pre-patent application evaluation and the value evaluation of the transformation of scientific and technological achievements, carry out the analysis of the investment and financing value of scientific and technological achievements and determine the investment projects. In addition, in order to promote the development of China's high-tech industry and improve the transformation rate of scientific and technological achievements, we should vigorously develop venture investment from the aspects of development environment, laws and regulations, fiscal and tax policies and talent training to guide venture investment to give full play to its real value.[25]

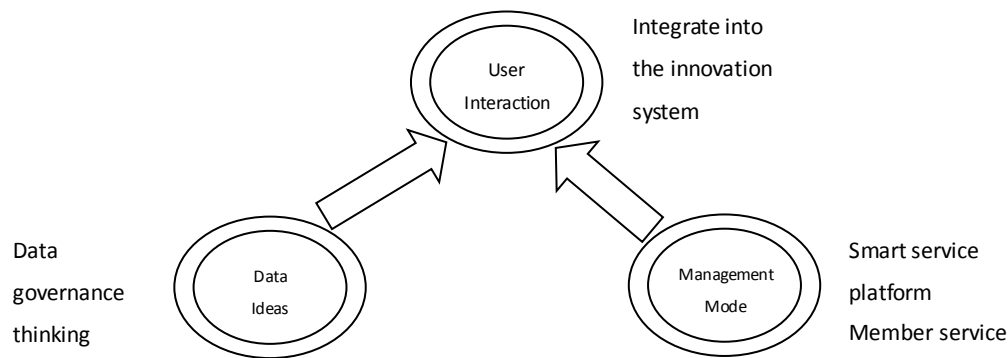
### **V. Construction and method of the precise transformation mechanism of scientific and technological achievements**

#### 5.1 Implementation implementation path of accurate transformation of scientific and technological achievements

The diversification of the participants in the transformation of scientific and technological achievements, the interactivity of the transformation process and the plasticity of the value of the achievements, by means of the amplification of data-driven proliferation, interaction and correlation, is of great significance to accelerating the "targeted" transformation of the transformation mode of scientific and technological achievements. In contrast with the requirements of data-driven precise transformation of scientific and technological achievements, it is necessary to establish a new concept of the transformation of scientific and technological achievements, innovate the management mode of the transformation of scientific and technological achievements, establish a precise mechanism for the transformation of scientific and technological achievements, and promote the benign interaction between data users in the transformation of scientific and technological achievements.

Based on this, the implementation path of accurate transformation of scientific and technological achievements can be implemented from three dimensions: establishing the new concept of data-driven transformation of scientific and technological achievements, the innovation of data-based achievement transformation management mode and the benign interaction between data users promoting the transformation of scientific and technological achievements, as shown in Figure 2.





*Fig 2: Development path of precise transformation based on "concept mode" innovation*

#### 5.1.1 Establish a new concept of data-driven transformation of scientific and technological achievements

First, we will cultivate the data governance thinking on the transformation of scientific and technological achievements. The transformation of achievements in universities should take the initiative to adapt to the rapid situation of the development of information technology, establish the concept of using data thinking, data guidance, decision-making with data and data innovation, reshape the management service process of the transformation of scientific and technological achievements based on data flow, and promote the transformation of scientific and technological achievements from experience decision-making to data decision-making. Second, strengthen the data management function for the transformation of scientific and technological achievements. We will adjust and establish data management agencies for the transformation of scientific and technological achievements, add data management positions for the transformation of scientific and technological achievements, be responsible for data collection and management, analysis and mining, innovation and application of the transformation of scientific and technological achievements, and strengthen the training of data management talents for the transformation of scientific and technological achievements to meet the needs of data management for the transformation of scientific and technological achievements. Third, we will formulate data management norms for the transformation of scientific and technological achievements. Clarify the responsibility for the collection, analysis and sharing of data for the transformation of scientific and technological achievements at all levels, standardize the content and methods of data collection, the scope and principles of data sharing, and ensure the authenticity and effectiveness of data. We will strengthen the awareness of data confidentiality for the transformation of scientific and technological achievements, disclose their scientific and technological achievements in universities and evaluation before patent application, and clarify the technical route and ownership of intellectual property rights involving scientific and technological innovation.

#### 5.1.2 Innovate a new mode of data-driven achievement transformation management

First, we will establish a membership system for science and technology services in universities. Accurate classification according to users' scientific and technological needs, provide personalized services for the transferred enterprises, and improve the loyalty of customer cooperation. For the enterprises served by the contract platform, they can obtain the whole process and the whole life cycle achievement information push service from scientific research project approval to achievement industrialization. Second, we will build a network system of smart technology service platform in universities. Around the "enterprise science and technology problem multidisciplinary consultation, remote science and technology service rapid response, school accurate and efficient push" goals, explore 5G technology based on the Internet technology service platform construction mode, build network, intelligent, information technology service big data platform, form an interactive, open, confidential wisdom technology service platform, fusion scientific and technology talents, scientific and technology achievements, enterprise demand, investment and financing information, realize online and offline service fusion, comprehensive depth into the scientific and technology innovation system. Third, we will improve the projects for the transformation and cultivation of scientific and technological achievements. In view of the scientific and technological needs of regions and enterprises, the government, universities and enterprises will jointly establish the transformation and

cultivation project of scientific and technological achievements, and entrust the scientific and technological needs proposed by enterprises after being evaluated and determined by the government, universities to carry out research and enterprises. Colleges and universities should serve enterprises and society with an open attitude, stimulate the enthusiasm of enterprises to participate in scientific and technological innovation, make the topic selection meet the needs and market of enterprises, and absorb enterprises to participate in the research. Fully obtain the interest and demand information of the social and market enterprises through various channels, and disclose the topic selection results to the public through the network platform to modify and adjust them timely.

#### 5.1.3 Establish a data-driven mechanism for accurate transformation of scientific and technological achievements

The mechanism for the precise transformation of scientific and technological achievements must be able to explain the internal role between the subjects and objects of transformation and transformation content, transformation channels and transformation effect of scientific and technological achievements. The essence is the process of refining, discovery, sharing and appreciation of the data value of scientific and technological achievements, as shown in Figure 3. Starting from the whole life cycle of the data transformation of scientific and technological achievements, we research the value logic of the data process, and establish the basis point and key coupling domain between the transformation process of scientific and technological achievements and data management. First, the collection mechanism of scientific and technological achievements and demand. The service platform for the transformation of scientific and technological achievements timely accepts and analyzes the personalized needs of scientific and technology-based enterprises, and provides enterprises with services such as the retrieval, inquiry and feedback of scientific and technological achievements. A system of guidance and triage of scientific and technological needs should be established, to guide enterprises to report their needs according to the perspective of scientific and technological innovation, and to transform them into specific technical solutions through demand dismantling, analysis and induction. After completing the analysis and acceptance of scientific and technological needs, it is necessary to accurately push the needs to the relevant scientific and technological personnel in time. Second, the mechanism for the evaluation and classification of scientific and technological achievements. Through data analysis and mining, professional analysis and sharing of data can realize the value proliferation of scientific and technological innovation data. Third, the precise push mechanism of scientific and technological achievements in colleges and universities. An activity that enables the planned, purposeful inward or outward transmission of information about relevant scientific and technological achievements through a variety of media. The push of scientific and technological achievements follows the principle of sales funnel. According to the classification of potential customers, intended customers and cooperative customers, the achievement data push pushes from "rough" to "precision". Fourth, the decision-making and correction mechanism for the transformation of scientific and technological achievements. Based on the data analysis and mining and accurate communication for the transformation of scientific and technological achievements, assist scientific and technological personnel to determine the transformation strategy of scientific and technological achievements, and provide decision-making suggestions for scientific and technological innovation projects, evaluate the transformation effect of scientific and technological achievements, and strengthen the relationship maintenance and management after the transformation, and timely adjust the strategies and methods for the deviation in the transformation of scientific and technological achievements to ensure the smooth implementation of the transformation.

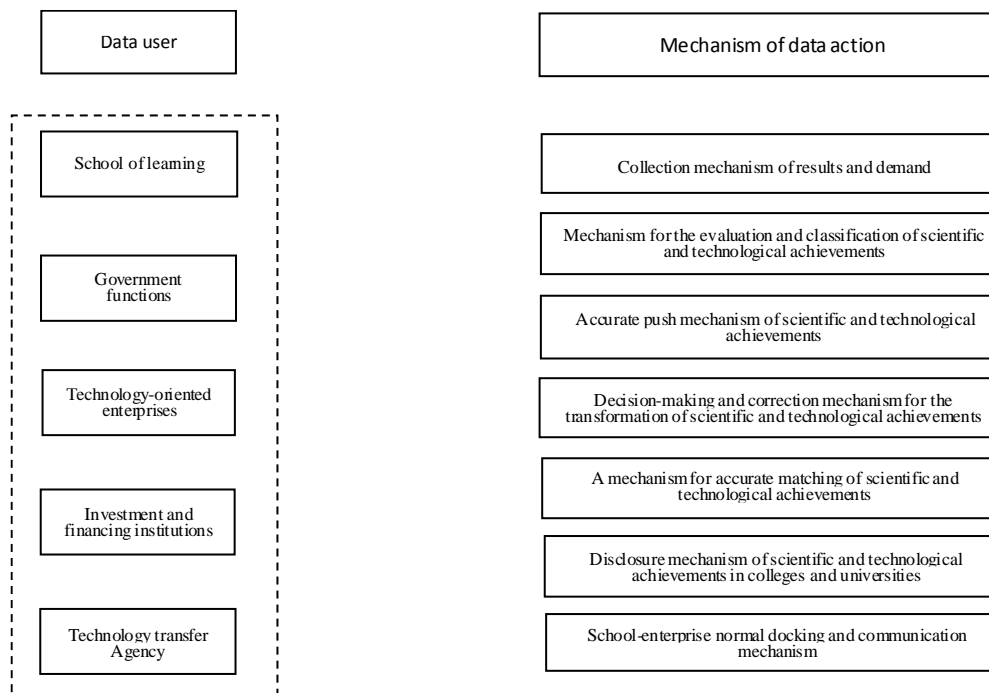


Fig 3: Precise transformation mechanism of scientific and technological achievements based on data driven

#### 5.1.4 Promotes the benign interaction between the data users of the transformation of scientific and technological achievements

First, integrate into the open innovation ecosystem. As the main body of innovation, universities need to rely on the cooperation of the subjects in multiple fields to achieve better technological innovation. Therefore, it is necessary to integrate scientific and technological innovation resources inside and outside the school, provide customized transformation services for scientific and technological achievements, and improve the ability of universities to serve the innovation areas and enterprises. Second, strengthen the performance assessment of the transformation of scientific and technological achievements. College scientific and technology achievements transformation data platform is a public welfare platform serving local economic development, all levels should include the intelligent science and technology service platform docking project funding, the operation results into the scientific and technological achievements transformation reward category, highlight the number of intelligent technology service platform docking enterprises, cooperation amount, transformation effect as indicators, to reward colleges and universities, and highlight the intelligent science and technology service platform operation department, maximize the enthusiasm of all aspects. Third, we will foster a data ecology for the transformation of scientific and technological achievements. It is a systematic project to realize the value of data transformation of scientific and technological achievements, which not only involves the construction of technical standards such as data collection, data integration, data processing, data analysis and data presentation, but also involves institutional innovation such as sharing mechanism, management mode and safeguard measures. Therefore, it is necessary to participate by all parties, optimize the development environment, promote innovative application, build a data ecology for the transformation of scientific and technological achievements, and form a good situation of the development and utilization of data resources for the transformation of scientific and technological achievements.

#### 5.2 Matching methods of scientific and technological achievements and technological requirements based on text similarity

With the support of the new generation of information technologies such as big data, the problems of data collection and storage have been solved, and the analysis and matching of scientific and technological needs and achievements have become the main aspects restricting the precise matching of the technology trading market. In view of the particularity of the technology market, aiming at "precision model" but also aiming at "precision data" - description

text data.

### 5.2.1 A collection of scientific and technological achievements and needs

Data collection and classification are the logical starting point for the accurate matching of technology transactions. In a sense, the comprehensiveness, objectivity and convenience of data collection determine the fluency of technical transaction matching. In practice, the asymmetry of technology supply and demand information and mismatch supply and demand are often encountered in the process of technology transaction. Technology transactions often involve suppliers (universities, institutes, R & D enterprise-technology providers) and receptors (enterprise-technology receiver). Therefore, the integrity of data acquisition for technology transactions mainly includes the diversity and integrity of the technical data of donors and the demand data of receptors. Among them, the technological achievements of the donor are the cornerstone of the prosperity of the technology trading market; the technology demand of the receptor is the catalyst for the continuous prosperity of the technology trading market, affecting and determining the direction of the donor technology innovation. Based on this, data collection and classification stage in mastering intellectual property and other scientific and technological achievements basic data at the same time, should expand the collection of scientific and technological personnel, research papers, research projects, take the initiative to collect master regional and enterprise technology demand data, as the direct basis of technology trading accurate matching and guide scientific and technological innovation, promote the technology trading of reserve resources.

### 5.2.2 Analysis of scientific and technological achievements and needs

Due to the needs of enterprises and the complex achievement description of colleges and universities, the data needed to be collected includes structured and unstructured data, and the number and importance of unstructured data is greater. Unstructured data refers to the information of the natural language, in which the initial extraction of information is called text preprocessing technology, including multiple kinds of processes, among which the segmentation process is the most important. The segmentation of English text data can be conducted directly through the space, the Chinese text segmentation is more complex, often need to be done through mature third-party library packages (such as jieba). Given the cross-industry and professionalism of technological achievements and requirements in the technology trading market, which requires word2vec's strong domain migration capabilities, text information processing for technological achievements and requirements is suitable for segmentation results to map to word vectors using Word 2 vec algorithms. Word 2 vec is essentially a dimension reduction algorithm, mapping a large number of words into 100-150 characteristic words, the mapping rules can be trained according to the text background, ensuring the text background characteristics.

### 5.2.3 Description of scientific and technological achievements and demand matching model based on text similarity

There are two opposite ideas to comparing text similarity: one is to directly compare the "distance" between two text feature vectors, and the other is to replace the characteristic vector of A text with the "cost distance" of the characteristic vector of B text. Among them, the "distance" and the "cost distance" are both representations of the intervector connection degree, and there are multiple mature calculation methods, which will no longer be repeated here. The WMD algorithm adopted for the text similarity calculation belongs to the second idea.[26] The preparation includes two tasks: one is to calculate the connection between two characteristic characters (European distance) between the A, B text, and to calculate the frequency of characteristic words in the A, B text in the original text.  $d_{ij} f_i f_j$

$$D_{AB} = \min_{T \geq 0} \sum_{i,j=1}^n T_{ij} d_{ij} \quad (1)$$

$$\begin{cases} \sum_{j=1}^n T_{ij} = f_i & \forall i \in \{1, \dots, n\} \\ \sum_{i=1}^n T_{ij} = f_j' & \forall j \in \{1, \dots, n\} \end{cases} \quad (2)$$

$1 > T_{ij} \geq 0$  Where  $T$  is the replacement matrix of two texts in  $A, B$ : the  $i$  word  $j$  in the  $A$  replace the  $j$  word in  $B$ ; the constraint means that the total frequency of all replaced  $i$  words in  $A$  is equal to the frequency of the  $i$  word in the original  $A$  text.  $A, B$  The similarity between the two texts is:

$$sim_{AB} = \frac{1}{D_{AB}} \quad (3)$$

According to the similarity between the text  $A$  of the enterprise technical demand and the technical achievements  $B$  of the scientific research institutions, the coincidence degree of the two fields and the technical details can be judged, so as to achieve accurate matching.[27] This method can effectively mine the topics concerned by the current enterprise R & D, and recommend the relevant achievements to the enterprise's technical needs based on the content similarity calculation method. Through the matching information of achievements, enterprises can contact relevant experts and finally realize the accurate connection between scientific and technological achievements and computing needs.

## VI. Conclusion

Guided by big data management thinking, this paper systematically discusses the user demand, action mechanism and technical platform of the whole life cycle of scientific and technological achievement transformation data from the two aspects of demand side and supply side of scientific and technological achievement transformation. The results show that mutual trust and normal docking between schools and enterprises are the basis for the accurate transformation of scientific and technological achievements; Data analysis and application of scientific and technological achievements is the core of accurate transformation of scientific and technological achievements; The service platform for the transformation of scientific and technological achievements is the support for the accurate docking of scientific and technological achievements. Based on this, we should accelerate the transformation of the governance concept of scientific and technological achievements transformation in Colleges and universities, strengthen the thinking of big data management, build a governance model of scientific and technological achievements transformation with data driving as the core, and improve the governance ability of scientific and technological achievements transformation; Strengthen the system enabling thinking, build a professional and comprehensive intelligent technology service platform for colleges and universities, and improve the efficiency of accurate docking between schools and enterprises; Strengthen the demand traction, establish the reporting, analysis and guidance mechanism of enterprise science and technology demand, and realize the fine collection of science and technology demand; Gradually build a mechanism for the transformation and cultivation of scientific and technological achievements, accurate promotion mechanism and reward and incentive mechanism based on the sharing of interests and risks synchronized with scientific and technological innovation. However, the paper has not carried out the description of scientific and technological achievements and demand matching model, and will carry out in-depth practice in the later stage of model application practice. Future research work can also further focus on the operation mode of scientific and technological achievement transformation platform and the accurate matching method model of supply and demand.

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