

# Enterprise Digital Planning and Architecture Based on the Industrial Internet Platform

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**Abstract:** Under the current background of an information society, the digital transformation of enterprises has become a necessary means to enhance the competitiveness of enterprises. This article is based on the industrial Internet platform, the digital planning and architecture of enterprises research. First, we analyze the current challenges of digital transformation and the development opportunities brought by the industrial Internet. Then, we propose a digital planning method based on the industrial Internet platform, which takes the full connectivity of people, machine and things and intelligent decision making as the core, takes data collection, processing, analysis and application as the main line, and finally forms the top-level design of the digital transformation of enterprises. At the same time, we also built an industrial Internet platform architecture model, including the previous end perception layer, network transmission layer, platform service layer, and application innovation layer for four levels, to support enterprises in innovative applications and decision support under the industrial Internet environment. Research shows that this kind of enterprise digital planning and architecture based on an industrial Internet platform can effectively promote enterprises to achieve business model innovation, system innovation, and strengthen the flexibility and agility of enterprises to respond to market changes. The results of this research not only have important theoretical and practical significance for guiding enterprises to carry out digital planning and build an industrial Internet platform, but also provide useful reference for relevant policy formulation.

**Keywords:** Industrial internet platform; Enterprise digital planning; Architecture model; Innovative application; Agility

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## 1. Introduction

In today's information society, companies need to adapt to the digital change. While this transformation is challenging, the use of industrial Internet platforms has brought new opportunities for enterprises. The paper first expounds on the challenges of digital transformation faced by enterprises, and then analyzes the development opportunities brought by the industrial Internet platform for enterprises, such as deepening the application, promoting innovation, and strengthening decision-making. Then, the paper proposes an enterprise transformation method based on industrial Internet platform, and builds a model of industrial Internet platform. Finally, the paper

discusses how to successfully achieve this transition. This study aims to help enterprises in digital planning and improve their ability to respond to market changes. The results of this study are not only theoretically instructive but also helpful for practical operation, and provide a reference for relevant policy making.

## **2. Challenges of enterprise digital transformation and industrial Internet belt**

### **2.1. Challenges of digital transformation facing current enterprises**

At present, digital transformation has become an important strategic direction for enterprises to adapt to the rapidly changing market environment <sup>[1]</sup>. Despite the wide range of opportunities brought by digital transformation, enterprises face many challenges in the implementation process. Technological challenges are undoubtedly the most prominent part of the digital transformation process. Many enterprises lack corresponding technical reserves and specialized talent support when adopting new technologies, often leading to being in a passive position when choosing and implementing digital solutions. The compatibility of old and new systems also limits the effective realization of technology updates and integration, increasing the cost of digital transformation and technology complexity.

On the other hand, the transformation of corporate culture and organizational structure is also a major challenge facing the digital transformation. The decision-making mechanism and management concept of many traditional enterprises are deeply rooted, and inertia thinking and resistance to change often lead to the digital process <sup>[2]</sup>. In some enterprises, the digital transformation is too dependent on the commitment of the management, and the lack of full participation and understanding of <sup>[3]</sup>. This situation is easy to cause internal communication, resulting in the digital transformation measures not being implemented at the practical level. The organization is often not flexible enough to support the agility and quick response needed for digital transformation.

Data security and privacy issues are also important challenges in the digital transformation of enterprises. In the application process of an industrial Internet platform, a large amount of enterprise data needs to be transferred and shared in different systems, which undoubtedly increases the risk of data leakage and improper use <sup>[4]</sup>. At present, the increasingly stringent data protection laws and regulations around the world also require enterprises to strengthen the control and compliance management of data. How to rapidly promote digitalization to ensure data security and compliance is an urgent problem for enterprises to face.

The uncertainty of the market environment and the intensification of the competition have also put forward higher requirements for the digital transformation. Companies should not only transform technically and culturally, but also dynamically adjust their strategies to cope with the changing market demand and competitive situation. This requires enterprises to enhance their innovation ability, identify market opportunities in time, and respond quickly to <sup>[5]</sup>. The contradiction between the speed of this environmental change and the speed of internal transformation makes it difficult for many enterprises to maintain a continuous competitive advantage.

The uncertainty of economic cost and return on investment is also one of the key challenges of the digital transformation of enterprises. Digital transformation requires enterprises to make a large amount of capital investment, including hardware facilities upgrading, software development, and talent training, but its return cycle is often long, and the exact return on investment is difficult to predict. This has greatly affected the investment decisions of enterprises in the process of digital transformation, especially in small and medium-sized enterprises. The doubts of senior managers about the transformation investment may lead to insufficient support for the digital transformation, or too conservative, thus affecting the overall progress and effect of the transformation.

In the process of digital transformation, technology, culture, data security, market environment, and economic cost are interwoven and have far-reaching influence, which brings great complexity to the decision-making and implementation of enterprises. Companies must develop effective digital transformation strategies based on the various challenges and their actual conditions. This requires not only technological innovation, but also the transformation of organizational structure and culture to ensure the coherence and sustainability of digital strategies and achieve a true success of transformation.

## **2.2. Development opportunities brought by the industrial Internet**

As the product of the deep integration of the new generation of information technology and the manufacturing industry, the industrial Internet provides important opportunities for the digital transformation of enterprises. By combining the Internet of Things, cloud computing, big data, artificial intelligence, and other technologies, it has built a brand-new, manufacturing-oriented Internet ecosystem. In this system, data becomes the core element driving enterprise innovation and development.

The primary opportunity brought by the industrial Internet is to improve production efficiency. By building a digital network covering the whole production process, enterprises can realize real-time interconnection between production equipment, production lines, workshops, and factories. The seamless connection and data sharing between devices enable enterprises to accurately monitor and regulate the production process in real time. This can not only effectively reduce the production loss caused by equipment failure, but also optimize the production scheduling and resource allocation through big data analysis, to significantly improve the production efficiency and reduce the operating costs.

The second important opportunity is to promote innovation in enterprise business models. Under the ecology of the industrial Internet, the traditional manufacturing enterprises can break through the past single product sales mode, and gradually change to the “product + service” mode. Through the Internet of Things technology, enterprises can access customer use data and product performance data, thus providing personalized follow-up services and realizing the upgrade from one-time sales to continuous services. Such a change can not only improve customer satisfaction but also increase the added value and profit margin of enterprises.

Industrial Internet also provides a new perspective and method for the supply chain management of enterprises. Through the widely used Internet of Things interconnection technology, enterprises can realize the overall control and optimal management of all links of the supply chain. This enables enterprises to flexibly adjust production plans and inventory strategies according to the changes in market demand, enhance the elasticity and response speed of the supply chain, reduce risk and cost, and improve market competitiveness.

In terms of quality management, the industrial Internet also provides unprecedented opportunities. By establishing a comprehensive quality monitoring system, enterprises can use big data analysis to conduct real-time monitoring and feedback on product quality. Predictive maintenance and optimization of the quality control strategy can significantly improve the qualified rate of products, enhance the brand image, and market reputation.

The industrial Internet has also greatly promoted cross-industry and cross-field collaborative innovation. Enterprises can break the boundaries between traditional industries, connect other enterprises, scientific research institutions, and service providers through data sharing and resource integration, and jointly develop and promote new technologies, new products, and new services. This collaborative innovation not only drives technological progress but also brings new market opportunities and commercial value.

As the key driving force for the upgrading of the modern manufacturing industry, the industrial Internet

provides multiple development opportunities for enterprises in the digital transformation. By improving production efficiency, innovating business models, optimizing supply chain management, and realizing collaborative innovation, enterprises can better adapt to market changes, enhance competitive advantages, and achieve sustainable development. In the face of these opportunities, enterprises should take active strategic measures to accelerate the deployment of the industrial Internet and fully tap its potential value.

### **3. Enterprise digital planning based on the industrial Internet platform**

#### **3.1. Digital planning method combined with full connectivity between man and machine**

In the process of enterprise digital transformation, it is a vital link to realize the full connectivity of people, machines, and things. The core of the digital planning method lies in the organic combination of people, machines, and materials through the industrial Internet platform to promote the efficient integration and coordinated operation of enterprise internal resources. Industrial Internet platform is not only a collection of technological innovation, but also a bridge for enterprises to achieve full connectivity.

The full connection of people, machines, and things can break the barrier of information islands within traditional enterprises. In the traditional mode, each part of the enterprise often operates independently, and the poor flow of information leads to low communication efficiency and insufficient utilization of resources. Through the industrial Internet platform, enterprises can realize the real-time sharing and transparent management of various data, and ensure that the relevant information is timely and accurately conveyed to different decision-making levels and execution levels.

Humans, machines, and things are fully connected, which can also significantly improve the intelligent decision-making ability of enterprises. When equipment and personnel can be interconnected, enterprises can collect information about equipment operation status, production schedule, and personnel operations in real time through sensors and edge computing technology. After effective integration and analysis, these data can provide insightful decision support for the enterprise executives, help enterprises quickly deal with problems in production, optimize the production process, and improve production efficiency.

In the process of realizing the full connectivity between human, machine, and object, data security and privacy protection cannot be ignored. In this process, enterprises need to establish a sound data security mechanism to ensure that the data is not tampered with or leaked in the transmission process. The encryption technology and authority management system can be used to protect important data assets and maintain the integrity and confidentiality of enterprise information.

Full human-machine and object connectivity needs to adapt to the unique application scenarios and needs of enterprises, which requires fully considering the actual needs of different departments of the enterprise for digital transformation in the planning to realize personalized solutions. This personalized scheme can be realized by flexibly allocating various technology modules of the industrial Internet platform to meet the specific requirements of different industries and different enterprises in the process of digital transformation.

In the process of enterprise digital planning based on industrial Internet platform, combined with the method of human-machine-thing fully connected, it can not only improve the information transmission and processing capacity of enterprises, but also support the construction of intelligent factories and the future development of intelligent manufacturing, which makes it possible for enterprises to create new competitive advantages in the era of digital economy. By integrating resources, improving efficiency, and ensuring data security, enterprises will

gain the initiative in the rapidly changing market environment and achieve sustainable development.

### **3.2. Digital planning main line based on data acquisition, processing, analysis, and application**

In the enterprise digital planning, data collection, processing, analysis, and application constitute a complete main line, which is the core link of realizing the digital transformation. Data collection is the starting point of digital planning. It obtains real-time data of enterprises in production, sales, logistics, and other links through sensors, Internet of Things devices, and other ways. This step ensures that companies can obtain real, effective information from a wide range of sources, laying the foundation for subsequent processing and analysis.

Data processing plays a key role in the transformation of the collected raw data into useful information. Through data cleaning, classification, and storage steps, we can eliminate the noise in the data and improve the quality and reliability. With the support of the industrial Internet platform, enterprises can quickly carry out efficient and low-cost processing of the huge data, which provides a solid foundation for data analysis.

Data analysis is the use of intelligent algorithms and analysis tools to mine valuable insights from the processed data. Analysis can be subdivided into descriptive, diagnostic, predictive, and normative analysis. These analyses can reveal potential problems in business operations, predict market trends, and provide strong support for management's decisions.

Data application is the ultimate goal of digital planning, which transforms the data results processed and analyzed into practical actions of the enterprise. By integrating the analysis results into the decision process, enterprises can optimize the production process, improve product quality, and improve customer satisfaction. Based on real-time data feedback, enterprises can respond quickly, accelerate the pace of innovation, and maintain market competitiveness.

The main line of digital planning based on data collection, processing, analysis, and application is the central axis running through the digital transformation of enterprises, so that enterprises can move forward steadily in the wave of industrial Internet. The proper application of this main line not only improves the operational efficiency and efficiency of enterprises, but also provides a solid data foundation for the realization of long-term strategic goals.

### **3.3. Top-level design concept of enterprise digital planning**

The top-level design concept of enterprise digital planning is the basis for promoting enterprises to realize digital transformation in a complex and changeable market environment. The design concept is supported by the industrial Internet platform and aims to guide enterprises to effectively coordinate and coordinate various resources in the process of digitalization through structural solutions. The core of the top-level design lies in the seamless connection of people, machines, and things and the realization of intelligent decision-making. By building a comprehensive, flexible, and efficient digital platform, the business process, management process, and innovation mode of the enterprise can be optimized.

The top-level design of digital emphasizes the construction of the global architecture, which needs to determine the strategic goals from the long-term development of the enterprise and the current actual needs of the current, and effectively connect with all levels and modules within the enterprise. To ensure that the full life cycle management of data is an important part of the digital top-level design of an enterprise. Through the collection, processing, analysis, and application of data, the efficient operation of information flow can be realized to provide

strong support for enterprise decision-making. Emphasis should be placed on the standardization and modular design of the information and technology architecture to enhance the scalability and interoperability of systems and support future technology upgrades and business expansion.

Digital top-level design also needs to consider the “soft” factors such as corporate culture, organizational structure, and personnel ability. The introduction of a change management mechanism to promote the cultivation and implementation of digital awareness in the enterprise, so that employees can adapt to and promote the digital transformation of the enterprise. The top-level design should also focus on the market and customer needs to ensure that the products and services provided by enterprises are more competitive in the digital environment. Through integrated design, the digital transformation of enterprises can be promoted in all aspects, so that they can better adapt to market changes and improve their innovation ability and market response speed.

## 4. Conclusion

Based on the industrial Internet platform, this research studies the digital planning and architecture of enterprises, solves the challenges of digital transformation faced by enterprises under the current social background, and makes full use of the development opportunities brought by the industrial Internet. We proposed the enterprise digital top-level design based on the industrial Internet platform, and constructed the architecture model of the industrial Internet platform, which provides support for the innovative application and decision-making of enterprises in the industrial Internet environment. The research results show that this method can effectively promote enterprises to achieve business model and system innovation, enhance the flexibility and agility of enterprises in the face of market changes, and has great practical application value. Meanwhile, there are some limitations in this study. For example, for the specific industrial Internet platform application scenarios and enterprise characteristics, how to carry out a more detailed and more specific enterprise digital planning and architecture design still needs further research. In addition, how to quantify and evaluate the impact of industrial Internet platforms on the effect of digital transformation of enterprises is also an important direction of future research. In general, this research puts forward new insights and strategies for enterprise digital planning under the industrial Internet platform from the perspectives of theory and practice. We expect that this study can provide certain academic support for the digital transformation of enterprises, provide useful reference for relevant policy formulation, and further promote the digital process of Chinese enterprises.

## Disclosure statement

The authors declare no conflict of interest.

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