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Understanding the Digital Revolution and Its Influences

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Chapter 1

Introduction: Understanding the Importance of the Digital Revolution



In February 2023, the Central Committee of the Communist Party of China and the State Council issued the “Overall Plan for Building Digital China”. The plan emphasizes that building Digital China is a crucial engine for advancing China’s modernization process and a strong support for constructing new national competitive advantages. Accelerating the construction of Digital China holds significant and far-reaching implications for comprehensively realizing socialist modernization and promoting the great rejuvenation of the Chinese nation. Therefore, research on digitalization has become a topic of strategic value, practical significance, and theoretical importance.

Currently, one of the main features of economic development is digitalization. Various economic sectors widely adopt digital production tools, recruit workers with digital technology skills, utilize digital technology to optimize production processes, enhance production efficiency, and drive innovation. The digital development model has become the consensus model for contemporary development.

In various scopes, from the United Nations, international organizations and national governments to various enterprises, institutions, and individuals, all are, actively or passively, participating in the process of digitization and experiencing its deepening impact. This indicates that digitization has exerted its influences beyond the mere economic domain, and the human society is gradually moving towards a digital society. Although the broad trend of digital development has become a consensus in the global society, yet individuals and organizations face confusion and concerns regarding the specific process and progress of digitization. This is due to the lack of a systematic understanding of the development logic of digital technology, which leaves the fundamental questions of the digital age not convincingly answered.

For example, how should we understand the systemic transformative impact brought about by digital technology? How can the digital development model become the dominant model of the times? Why do humans pursue digitization? Is digitization an inevitable choice for human development? What are the standards for measuring

the level of digital development? What is the driving force behind digital development? Although digital development has become a consensus, this consensus is only formed from the direct and obvious short-term economic benefits of digitalization, and there are few systematic answers to those basic questions of the digital age mentioned above. To effectively promote digitalization and achieve sustainable digital development, we must systematically answer those questions within a coherent theoretical framework. Only by answering the questions well can we promote the digital process more forcefully, avoid potential risks and pitfalls, and achieve sustainable and high-quality digital development.

First, we need to understand the systemic transformative impact of digital technology. The reason why the digital development model has become the dominant model of the era is because the rapid development and widespread application of digital technology have propelled comprehensive changes in various fields such as the economy, society, culture, and politics. The pursuit of digitization by humanity is due to the myriad changes and benefits digitization can bring about, such as enhanced productivity, accelerated innovation, improved quality of life, and strengthened national competitiveness.

The driving force behind digital development comes from the comprehensive effects of influencing factors such as technological innovation, economic globalization, and changes in the social demand. Therefore, we must reexamine the fundamental questions of the human society to understand the driving mechanism and development goals of digitization. The process of digitization results from the development of information technology, and information technology is thus the direct force driving the process of digitization. To truly understand digitization, we need to start from the development history, characteristics, and development logic of information technology and examine this historical process.

1.1 The Greatest Challenge of the Current Era: Poverty of New Ideas

Humanity's basic scientific theories remain rooted in quantum mechanics and relativity, which were established over a hundred years ago. However, the contradictions between these two theories have yet to be effectively bridged, as humanity has lacked the generation of new cognitive ideas for the past century. We are currently in an era of intellectual scarcity, in urgent need of a revolution in cognitive tools to enable the birth of new ideas.

There are two main reasons for humanity's shortage of new ideas: first, humanity is gradually approaching the boundaries of known cognitive tools, making it increasingly difficult to generate new thoughts. Despite the continuous increase in the number of scientific papers, the development of new scientific ideas has become

slower and even stagnant. Many of the so-called new discoveries or new knowledge produced daily are logical consequences naturally deduced within established theoretical frameworks, rather than revolutionary insights.

The fundamental reason for this situation lies in humanity reaching the boundaries of the cognitive tools that have been invented—the language. In the early twentieth century, Ludwig Wittgenstein’s philosophy of language emerged, in which he proposed the view that “the limits of language are the limits of thought”, indicating that people began to realize the limitations of language tools at the cognitive level. Furthermore, Gödel’s incompleteness theorems demonstrated the incompatibility between the completeness and consistency of arithmetic systems, while the decidability proof of the Turing halting problem revealed the cognitive boundaries of rational tools—mathematics and logic. These achievements indicate that humanity has approached the effective boundaries of the cognitive tools it has invented, making the generation of new ideas increasingly difficult, and almost all fields are developing in a deteriorating manner characterized by “involution”. Whether it is the production of new knowledge in the field of scientific research or the production of goods and services in the economic domain, the space for incremental development has become extremely limited. This indicates that the development of the digital age cannot be addressed with past ways of thinking and cognition, nor can the process be driven by past approaches.

Second, the specialization and division of labor in various disciplinary fields have become overly specialized, leading to an over professionalization of knowledge production. Owing to the deepening specialization of various disciplines and the centralization of knowledge production, fewer and fewer people can return to the starting point of understanding research questions or the origin of knowledge formation to reassess existing cognitive achievements systematically and effectively. People have become accustomed to interpreting or explaining current changes using past classics and are more inclined to view ongoing and forthcoming trends through the lens of past experiences, rejecting viewpoints that deviate from tradition.

Therefore, despite the digital age being widely seen as a new era of transformation, when it comes to understanding and interpreting the comprehensive digitization wave sparked by digital technology, people often resort to concepts, contexts, and analytical frameworks developed during the Industrial Revolution of 200 years ago. They frequently use the historical development of electrification and automation technologies as a reference point to examine the impact of digital transformation. This makes it challenging for us to break free from the cognitive patterns influenced by the era of industrial technology. How to fully utilize the historical experience accumulated by industrial civilization over more than 200 years, combined with the latest achievements in contemporary scientific cognition and the new practices of digital exploration, to think beyond the perspective of the industrial age and envision the future development of the digital age, becomes the path that everyone aspiring to grasp the new opportunities of the digital age and become leaders of the era should choose.

Humanity is gradually approaching the boundaries of its cognitive tools’ ability or functionality to understand the world. This is the fundamental reason for the lack

of new ideas in humanity, with the impact of specialized division of labor being relatively secondary. Therefore, to address the significant changes brought about by the digital age, humanity needs to embrace new cognitive tools and embrace the arrival of the era of change. This is the fundamental approach to solving many of humanity's current problems. The digital transformation brought about by digital technology, especially artificial intelligence technology, will open brand new opportunities for humanity in the field of cognitive tools.

1.2 The Cognitive Revolution: Reevaluating Humanity in the Digital Age

The transformation of the digital age is a systemic change in the human society, and understanding this systemic change inevitably requires starting from a reevaluation of humanity itself. Over the past two decades, numerous advancements in the field of life sciences, particularly the invention of many new cognitive tools, have laid the foundation for reevaluating the essential attributes of humanity. This allows us to move beyond subjective imagination or the use of “black box” theoretical models to understand humanity and to establish a more accurate understanding of the essential attributes of human beings. Instead, we can start from the biological essence of human beings to understand the social logic of human societal development, thus avoiding the subjective “fantasy” biases inherent in traditional sociological analysis frameworks.

In recent decades, the field of life sciences has witnessed the emergence of many new cognitive tools, such as gene editing technology, cryo-electron microscopy technology, and multidimensional multiscale high-resolution microscopy imaging technology. These new cognitive tools have provided us with a completely new understanding of ourselves, directly involving the cognitive of the biological essence and functionality. This new cognition formed by the innovation of new cognitive tools is a crucial key to understanding the changing dynamics of the times. Since only a cognitive tool revolution has genuine developmental significance, these tools not only determine the boundaries of human cognitive capabilities and understanding of themselves but also determine the limit of human wealth creation capabilities.

1.3 The Development Logic of the Division of Labor

The application of digital technology will bring about breakthrough impacts on the social division of labor. In the digital age, the challenge lies in the fact that the mode of cooperation between people depends on the collaboration between humans and machines, which gradually diminishes the dominant position of humans. This transformation brings about two fundamental changes: the change in the scarcity of

information elements and the change in the scarcity of labor elements. These two prominent changes are fundamentally different from those in other historical periods and are the foundational conditions for the social system of the division of labor, hence their impact is inevitably transformative.

The evolution of the social system of the division of labor began with early hunting cooperation where individuals collectively acquired food, which has gradually evolved into today's complex system of producing thousands or millions of different products. The evolution of the division of labor system has always been led by the development and innovation of production tools. In the past, tools created by humans, whether simple hoes or wheels, or more complex steam engines and motors, were designed to expand human capabilities. Therefore, the changes these tools brought to the social division of labor were limited, and individuals could adapt to their impact through limited learning time.

With the invention of computers, especially the rapid development of digital technologies such as artificial intelligence and big data in the past decade, human's ability to process information has begun to be replaced by machine systems. Decision-making abilities are constrained by information processing machine systems, shaking the original foundation of cooperation between people. The emergence and continuous iteration of digital technology tools like ChatGPT have led to a noticeable decrease in communication efficiency between people compared to the efficiency of communication between machines. This implies that the division of labor and cooperation between humans must yield to the division of labor between humans and machines. Nowadays, without information processing tools like computers, humans are unable to meet the increasingly complex demands for information processing. This poses an unprecedented challenge to the current the social division of labor—the mode of cooperation between humans and machines affects and determines the mode of cooperation between people, which has gradually weakened the dominant position of humans.

As a result of this challenge, humans must adapt to new models of human-machine collaborative decision-making, make necessary adjustments to organizational forms and mechanisms, and promptly adjust the distribution of the division of labor outcomes as well as the value evaluation mechanism. This also heralds the emergence of a new business civilization. Currently, there are two exploratory directions in the evolution of human-machine collaboration models: one is the traditional approach, where humans iterate and update their skills to meet the new requirements of human-machine collaboration; the other is the development of brain-machine interface technology, attempting to physically integrate humans and machines by implanting chips into the human brain to achieve an organic combination of human and machine information processing capabilities. This technological development is one of the significant challenges faced by digital development, as it necessitates the redefinition of human nature, raising concerns about a series of unpredictable challenges that may arise from the ethical implications of this technology.

1.4 Reflecting from a Historical Perspective

The history of human civilization is filled with contingencies and traces of historical figures. While some historians consider this as one of the laws of human history, when the development of a social system is full of contingencies, it means that this social system lacks autonomy and cannot effectively grasp its own path and direction. This reflects that as a whole; humanity still lacks sufficient ability to arrange and choose its own development direction. From a certain perspective, this is because human civilization is still at a relatively low level of information processing efficiency, has not fully explored the possibilities of future development, and lacks the ability to reflect human autonomy on the historical path.

The repetition of history stems from the structural invariability of the development of events. If history encounters a singularity in development, then historical insights will trap us in a repetitive cycle, unable to break out of the original development path, and unable to truly envision a more imaginative future.

In understanding and analyzing the social division of labor in the digital age, if one chooses to think in historical dimensions, one must be clear about its potential hidden conditions, namely whether the division of labor between humans and machines has reached a historical singularity. If not, then history can serve as a reference for understanding reality. However, if approaching a historical singularity, then we must reexamine this issue. Therefore, it is necessary to start with whether there has been a fundamental change in the relationship between humans and machines in terms of the division of labor, to understand the mechanism of the impact of digital technology on the social division of labor. If the division of labor between humans and machines leads to most people no longer being necessary production factors, then the reproduction process of humans and the reproduction process of products will not be able to develop in a unified and coordinated manner, and the circulation of value between them will be challenged. This will lead to economic stagnation, population decline, and challenges to social sustainable development. In this case, we must reexamine the conditions of the division of labor issue and the source of sustainable development momentum.

The development of digital technology, especially big data and artificial intelligence technology is causing a qualitative change in the relationship between humans and machine tools in the social system of the division of labor, and the dominant position of machines is becoming increasingly apparent, albeit currently mainly manifested through the power of capital. The singularity of historical development may be approaching, which means that we should turn to a more fundamental way of thinking, starting from “first principles” to consider the current changes and future trends. We should consider the social division of labor in the digital age from the perspective of the social value source of humans and the social value root of machine tools, starting from the essence of human attributes and the purpose of human social development. Otherwise, humanity will pay too much cost and price in the process of seizing the historical opportunity given by history to break out of the original historical development path.

Therefore, understanding the transformation of the digital age implies understanding the issues of human social development. The transformation brought about by digital technology involves the modes of production and lifestyle of the human society, so the most important impact of this era of change is the change in relationships between people. And the relationships between people depend on the relationship between people and things, because the maintenance and development of the human society are both supported and influenced by the material world.

The relationship between people and things is determined by the objective attributes of human beings, that is, human needs for things. For example, the types and quantities of food intake depend entirely on the natural biological attributes of humans. Therefore, we must return to the understanding of the biological attributes of humans. Understanding the biological attributes of humans is a purely scientific and technical issue, not a sociological or ethical issue. New technological cognitive tools resulting from the Human Genome Project and its subsequent developments, such as gene editing technology, cryo-electron microscopy technology, and multi-dimensional, multi-scale high-resolution microscopy technology, enable scientists to conduct research at different microscales, such as cells, proteins, and molecules. For example, multi-dimensional, multi-scale high-resolution microscopy technology can achieve real-time imaging of the entire brain, allowing scientists to directly observe the discharge process of neurons during thought processes.

Nowadays, we no longer need to rely on subjective observations and speculations like past social scientists to understand what humans are and how life systems operate. New cognitive tools have brought revolutionary new cognitive achievements in multiple dimensions of human behavior, psychology, and social behavior. Therefore, it is time to abandon outdated cognitive frameworks about human beings and to re-understand humanity with the help of new research results in the field of life sciences, and thus to understand the trends of the era of change.

1.5 Digital Transformation: Rooted in the Inevitable Direction of Human Development

From the perspective of examining human cognition, we can draw an important conclusion: the occurrence of the digital technology revolution is historically inevitable, stemming from the inevitability of the direction of human development.

1.5.1 Humans as Processors and Stors of Environmental Information

The ability to process information is an inherent capability of humans and forms the core of their connection with the world. Information constitutes the most fundamental