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Digital enterprise capabilities from a human genetics perspective

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Abstract. The article actualizes the problem of digital transformation of enterprises, which is based on a comparative analysis of the positive effects of human genetics. The authors describe in detail the possibilities of digitalization in human life based on human genetics, reveal the features of the process of digital transformation of the enterprise based on the functioning of the data processing center, comparing it with the activity of the human nervous system. The study substantiates the need to develop technological platforms to support the digital system and accelerate the achievement of business goals, citing the responsible key human genes as an example.

Key words: digital transformation, digitalization, genes, human genetics, nervous system, technology platforms, digital system.

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Научная статья
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Возможности цифрового предприятия с точки зрения генетики человека

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Аннотация. В статье актуализируется проблема цифровой трансформации предприятий, которая основана на сравнительном анализе положительных эффектов генетики человека. Авторы подробно описывают возможности цифровизации в жизни человека на основе генетики человека, раскрывают особенности процесса цифровой трансформации предприятия на основе функционирования центра обработки данных, сравнивая его с деятельностью нервной системы человека. В исследовании обосновывается необходимость развития технологических платформ для поддержки цифровой системы и ускорения достижения бизнес-целей на примере ответственных ключевых генов человека.

Ключевые слова: цифровая трансформация, цифровизация, гены, генетика человека, нервная система, технологические платформы, цифровая система.

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Introduction

In today's era, the importance of digital capabilities for enterprises is increasingly prominent. However, how to assess the digital capabilities of an enterprise and how to effectively carry out digital transformation are challenges faced by many CIOs. In the past, the digital department was usually regarded as a support department, with a status equivalent to that of personnel, finance, and administration departments. However, the current digital transformation has moved forward and is in parallel with business goals. The digital processing capability of an enterprise directly determines its self-iteration and evolution speed. This article will

look at the digital maturity model of enterprises from the perspective of human genes, as the human body itself is like a nearly perfect self-circulating system. Starting from the ape-men more than 50 million years ago, regardless of how the environment changes, humans can always gradually adapt and constantly complete biological evolution, which forms modern humans [Harari 2012]. Similarly, the digital transformation of enterprises should also draw on this adaptive mechanism to cope with the uncertainty of the business society. We will provide a reference model for each enterprise undergoing digital transformation by comparing human genes and digital capabilities, and determine the development direction.

Intelligent life and digitalization capability

The reason why the human body can dominate the earth is mainly because humans have always been a life form with intelligence [Miller1992]. Humans have excellent adaptability, advanced intelligence, and efficient social organization. Through the continuous development of science and technology, human intelligence has also been continuously improved, while creating more advanced tools and technologies, making human life more comfortable and safe.

The four major genes of the human body determine its evolutionary process, namely: intelligence gene [Wisdom of crowds... 2012], agility gene [Glaiel 2013], open gene [Lyu 2015], and health gene [Khoury 1996]. These genes correspond to various systems of the human body, and bear specific abilities to complete specific tasks. These abilities also have corresponding organs, forming a closed loop from organs to abilities to systems, and finally to genes. Let's take a closer look at the corresponding relationships between them:

The intelligent gene mainly corresponds to the human nervous system, which is responsible for perception, cognition, and decision-making. For the human body, the brain is the organ responsible for cognition, the spinal cord is responsible for gathering information, and the nerve endings are responsible for sensing external stimuli.

The agile gene also corresponds to the nervous system, which mainly involves flexibility and motor ability. For the human body, joints are the fulcrum of flexibility, muscles are responsible for stretching and storing energy, and bones play a supporting and leveraging role.

The open gene corresponds to the human circulatory system. It mainly involves the flow, transportation, and infiltration of blood. The heart is responsible for driving blood flow, while arteries and veins are responsible for transporting blood, and capillaries are responsible for infiltration.

Finally, healthy genes correspond to the human immune system. It mainly involves self-regulation, surveillance, and defense functions. Immune substances are responsible for self-regulation, immune organs are responsible for surveillance, and immune cells play a defensive role.

These genes and abilities circulate in the human body and are constantly evolving, enabling humans to adapt and evolve. When studying the digital capabilities of enterprises, we can draw lessons from them to build a self-contained digital capability model that is suitable for enterprises. In the following chapters, we will combine the basic structure of the human body with our understanding of digital capabilities to create a model that can be used for self-assessment, allowing each enterprise undergoing digital transformation to refer to and compare it.

Smart gen nervous system

The core of human intelligence lies in cognition, and the change of cognition is derived from the synergistic action of the nervous system. In the human body, the interaction between the brain, spinal cord, and nerve endings constitutes the main body of the nervous system, which aggregates a large amount of information and transmits it to the brain for decision-making.

For enterprises, the "nervous system" in digital transformation is the closest to the construction of a data center. In the process of digital transformation, the data center embeds data collection points in various digital systems. The role of these collection points is similar to that of nerve endings, used to collect various types of data generated in digital systems.

These data are aggregated through multiple data platforms, just like the role of the spinal cord in the nervous system, transmitting the collected data to a central data processing unit for further analysis and decision-making. These data platforms can be user data platforms, vehicle data platforms, quality data platforms, etc., which process and store different types of business data separately.

After collecting and summarizing a large amount

of data, enterprises need to use BI reporting tools to conduct in-depth analysis of business data, so that management can make more informed decisions. Management plays the role of the brain in the enterprise, and they need to develop and implement business strategies based on data analysis results.

The wisdom gene in digital transformation is precisely the ability to collect a large amount of process data, which enables enterprises to make decisions more efficiently. Through the analysis of historical data, enterprises can utilize AI technology to form automated decision-making capabilities, further improving operational efficiency and decision-making quality.

In summary, the digital transformation of enterprises draws on the wisdom genes of the human nervous system, and improves the cognitive ability and decision-making efficiency of enterprises through the construction of data platforms and the use of artificial intelligence technology [Jin Weiyong 2022]. This kind of reference not only helps enterprises to better adapt to the constantly changing market environment, but also provides strong support for their continuous self-iteration and evolution.

The following figure 1 shows a digital example of the nervous system.

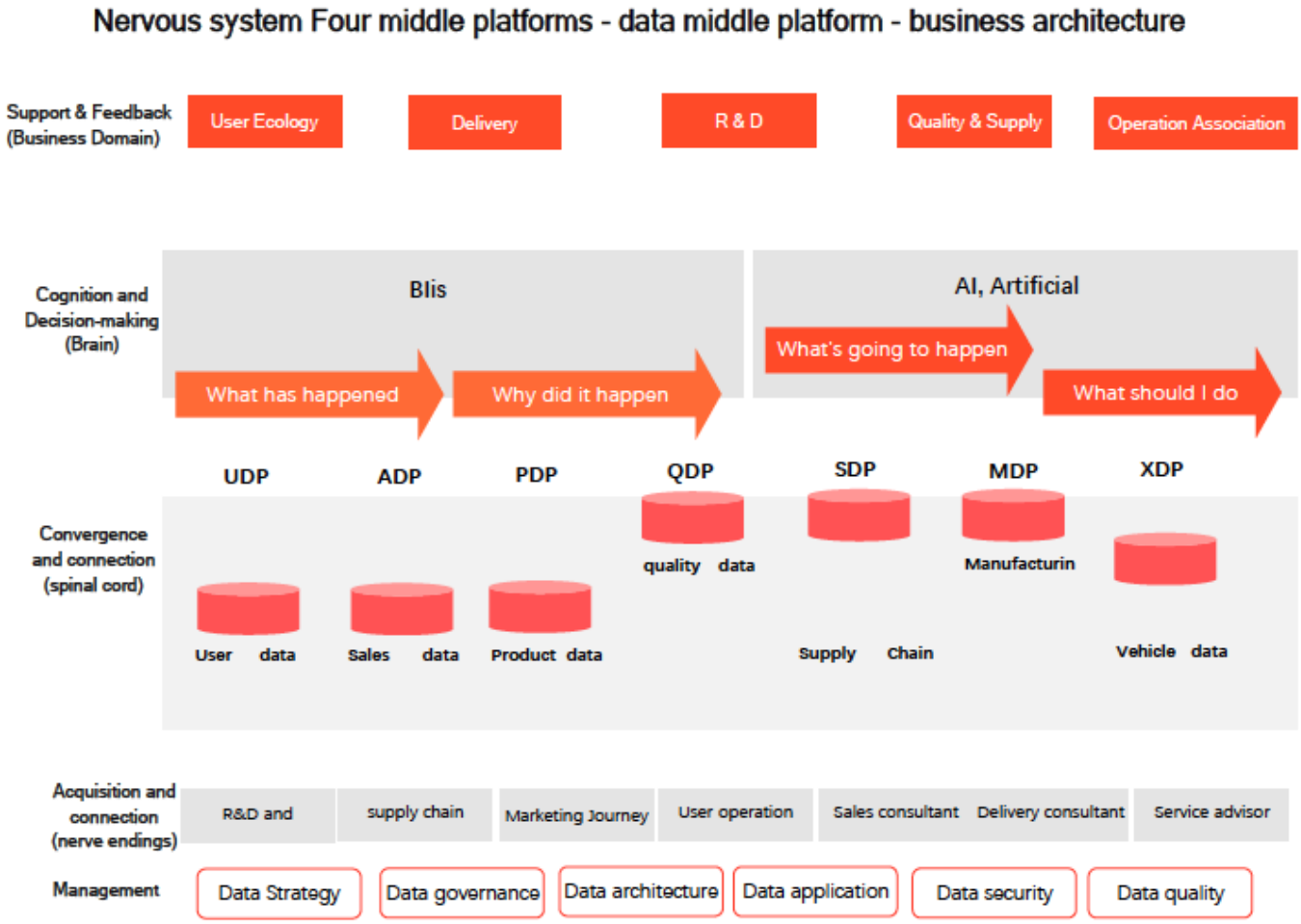

Fig. 1. A digital example of the nervous system
Source: Authors' diagram based on data from this study

Agile gene – motor system

In the digitalization department of an enterprise, one of the main responsibilities is to help various business departments implement digital systems. However, how to make digital systems land faster and more stably has always been a challenge faced by every digitalization department. In the face of constantly changing demands, how to adapt to changes and summarize demands for rapid delivery requires drawing on the agile gene in human genes — the motor system.

The human movement system is mainly composed of joints, muscles, and bones [Dimon 2001]. The cartilage in the joints plays a flexible

role, while the joints themselves also have a fulcrum effect. Compared to the digital transformation of enterprises, this is like a research and development operation platform. It can play a role in rapid continuous integration and continuous deployment, and even achieve gray release and rolling release, thus ensuring that the development capabilities and online operation capabilities of enterprises can be highly integrated. This can greatly liberate the IT operation and maintenance costs of enterprises.

Muscles play a role in stretching and storing energy in the motor system. Through daily training, muscle fibers can grow, thereby releasing amazing energy when needed. This is like the technology platform of an enterprise, which usually develops and reserves some basic technical components, such as message sending, file uploading, OCR scanning, and other abilities that are often used in digital systems. When needed, the technology platform can support the development of the entire digital system and can be quickly integrated and used, thereby saving development efficiency, accelerating the iteration pace of the digital system, and enabling faster achievement of business goals.

Bones play a supporting and leveraging role in the motor system, making it possible for humans to move freely. Only a fully intact bone structure can enable people to continue to exert the role of joints and muscles, thereby truly enhancing their overall motor ability. In the enterprise, bones are like our cloud infrastructure platform [Narayan 2022]. Any problems with our cloud services, databases, message queues, networks, etc. will greatly reduce the effectiveness of our digital system, and in severe cases will cause system failure [Li Liuying 2021]. Therefore, having a complete cloud infrastructure platform is the foundation for system digitalization.

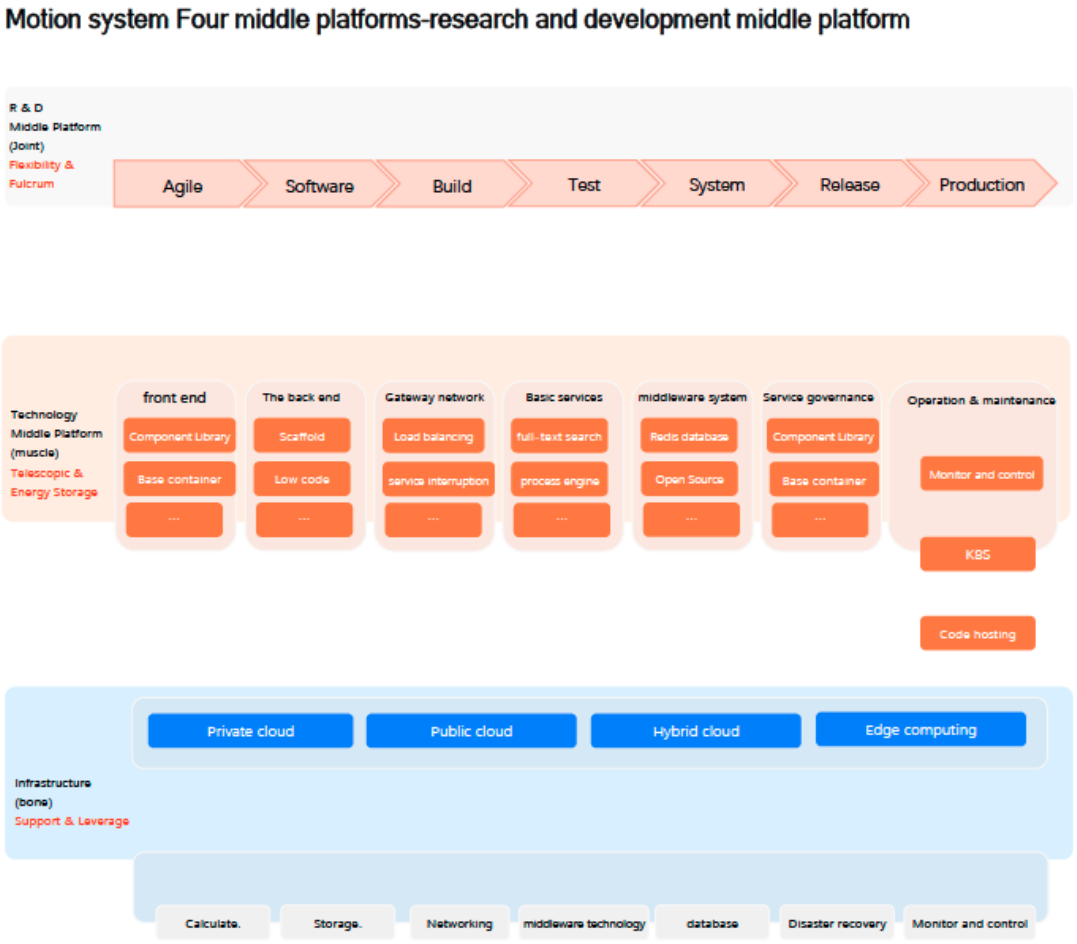

Fig. 2. The digitalization corresponding example of the motion system
Source: Authors' diagram based on data from this study

In summary, the digital transformation of enterprises draws on the agile gene in human genes — the motor system. By building R&D operations, technology, and cloud infrastructure platforms, enterprises improve the agility and rapid response capabilities of their digital systems. This

reference not only helps enterprises better adapt to the constantly changing market environment, but also provides strong support for their continuous self-iteration and evolution.

At the same time, the digital transformation of enterprises also requires continuous improvement of various capabilities. Just like humans need to exercise to improve their athletic ability, enterprises also need to continuously improve their cloud infrastructure capabilities, technology platforms, and research and operation platforms. Only in this way can enterprises truly possess extraordinary digital capabilities and iterative capabilities. In the future business competition, these capabilities will bring huge advantages and competitiveness to enterprises.

The figure 2 shows the digitalization corresponding example of the motion system.

Open gene-circulatory system

The main function of the human circulatory system is to carry out the circulation of body fluids [Circulatory System Based... 2022]. In the blood system, blood is transported to the entire body through organs such as the lungs, kidneys, heart, and blood vessels, and nutrients from the digestive tract are delivered to the required tissues and organs to maintain sustained energy and vitality. Similarly, a modern enterprise is like a human body, with functional departments at all levels. These departments also require continuous nutrient supply to maintain efficient operation, just like the various organs of the human body. This requires our digital departments to have a strong open gene [Conditional activation of ... 2004].

The circulatory system consists of the heart, arterioles, venules, and capillaries. The main function of the heart is to promote blood circulation, provide blood supply to body organs, and pump blood. This is like the various products our company delivers to users. The sales situation and user reputation of the product directly determine the success or failure of a company. In order to provide better products, the launch of each product depends on the collaboration of multiple departments, such as research and development, sales, delivery, quality, and user operations. The digital department needs to provide corresponding systems and tools for these departments to ensure that these departments can achieve language unity, behavior unity, and management unity in the process of mutual collaboration. Only in this way can the company be united and succeed at one fell swoop [Wong 2023].

Arteries are blood vessels that transport the blood pumped out by the heart to various tissues and organs around the body or the lungs for gas exchange. The speed of the operation of the arteries determines the speed of the metabolism of the heart and lungs in the human body, and so does the enterprise. Our digital enterprise needs a corresponding business platform to enhance the iteration and evolution speed of the enterprise digital system. We know that if an enterprise has multiple systems, the accumulation over a long period of time will be like various chimneys, which is difficult to maintain. What we need is to extract and integrate these business forms with similar functions into a business platform, which not only has unified management, but also greatly improves efficiency on the business side. In practice, we have found that a settlement platform can summarize the settlement modes of various products in the enterprise, integrate various payment scenarios (cash, points, cards and coupons) as well as tax rate and exchange rate scenarios, and submit them to the financial system. Each business system only needs to focus on its own business logic, and does not need to learn professional financial logic, greatly reducing the burden on the business system. Therefore, the strength of the artery can ensure the strength of the human body, and the strength of the business platform can also ensure the continuous and efficient iteration of the enterprise.

Capillaries have the function of connecting arterioles and venules, transporting blood, and exchanging substances with tissues. They can truly link various organs in the human body. In the enterprise, in addition to newly delivered digital systems, there are still some relatively outdated systems still in use. These systems are relatively incapable of expanding their architecture and data are relatively closed, resulting in some important data in the enterprise being unable to communicate. At this time, digitalization also needs its own capillaries to connect such new and old systems, forming a truly open gene. This requires the use of our integration platform, through the low-code API programming and embedding capabilities, it can build a data interface layer in the old system. The API opened on it can achieve data transmission as long as it conforms to the standard interface protocol

(Restful), which can completely open the enterprise's circulatory system. At present, many Chinese companies have noticed this business opportunity and started to develop, such as Huawei's ROMA system, which can integrate not only software but also hardware [Wiklund 2003].

The following figure 3 shows Schematic diagram of Huawei ROMA network architecture.

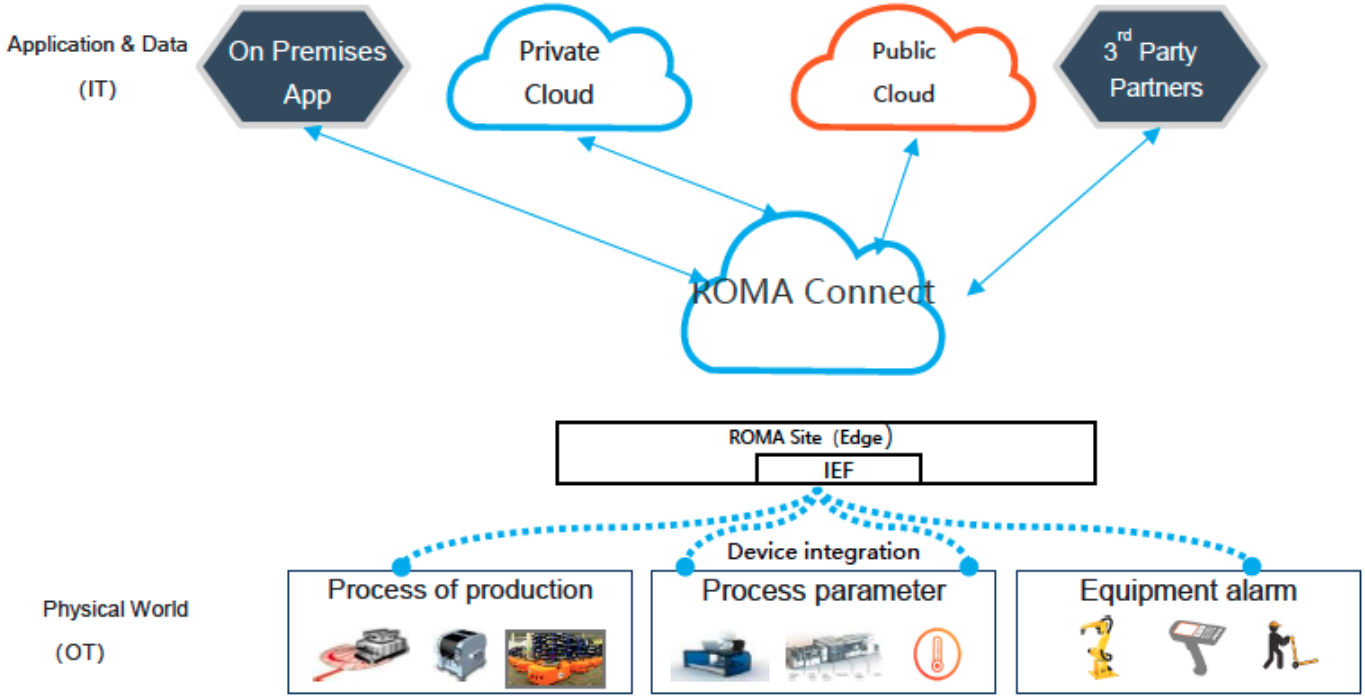

Fig. 3. The digitalization corresponding example of the motion system
Source: Authors' diagram based on data from this study

It can be seen that the digital transformation of enterprises draws on the open gene of the human genome-the circulatory system. By building powerful digital platforms and tools, enterprises can promote collaboration and communication between various departments, accelerate the iteration and evolution of digital systems, and achieve interconnection between old and new systems. This kind of reference not only helps enterprises to better adapt to the constantly changing market environment, but also provides strong support for their continuous self-iteration and evolution.

The digital schematic diagram of the circulatory system is as follows (Fig. 4).

Healthy genes-immune system

Finally, let's look at the health genes of humans. The reason why the human body can maintain health is entirely dependent on a complete immune system. The immune system ensures that the human body is protected from viruses and bacteria, and it consists of immune substances, immune cells, and immune organs, which play the roles of self-regulation, surveillance, and defense. Similarly, enterprise information security is also a top priority, and any carelessness may bring devastating blows to the enterprise. Unlike other genes, in order to ensure the health of enterprise information, information security usually requires comprehensive defense. Because unknown attacks are happening all the time, in addition to surveillance and defense, we also need the ability to quickly recover, so as to maximize the protection of enterprise operations. Therefore, we need to establish a security platform, which can provide comprehensive protection for enterprises from data, applications, and systems [Characteristics of anti-CLL1... 2022].

Firstly, immune substances mainly regulate the environment of the autoimmune system, remove damaged and dead cells, and maintain the stability of the immune system. In the security center, this corresponds to data security. Data is the foundation of everything, and only when data is secure can the enterprise operate safely. Therefore, the automation desensitization of some key data by enterprises can ensure that even if competitors obtain the

data, they cannot find the corresponding analysis method and cannot identify the meaning.

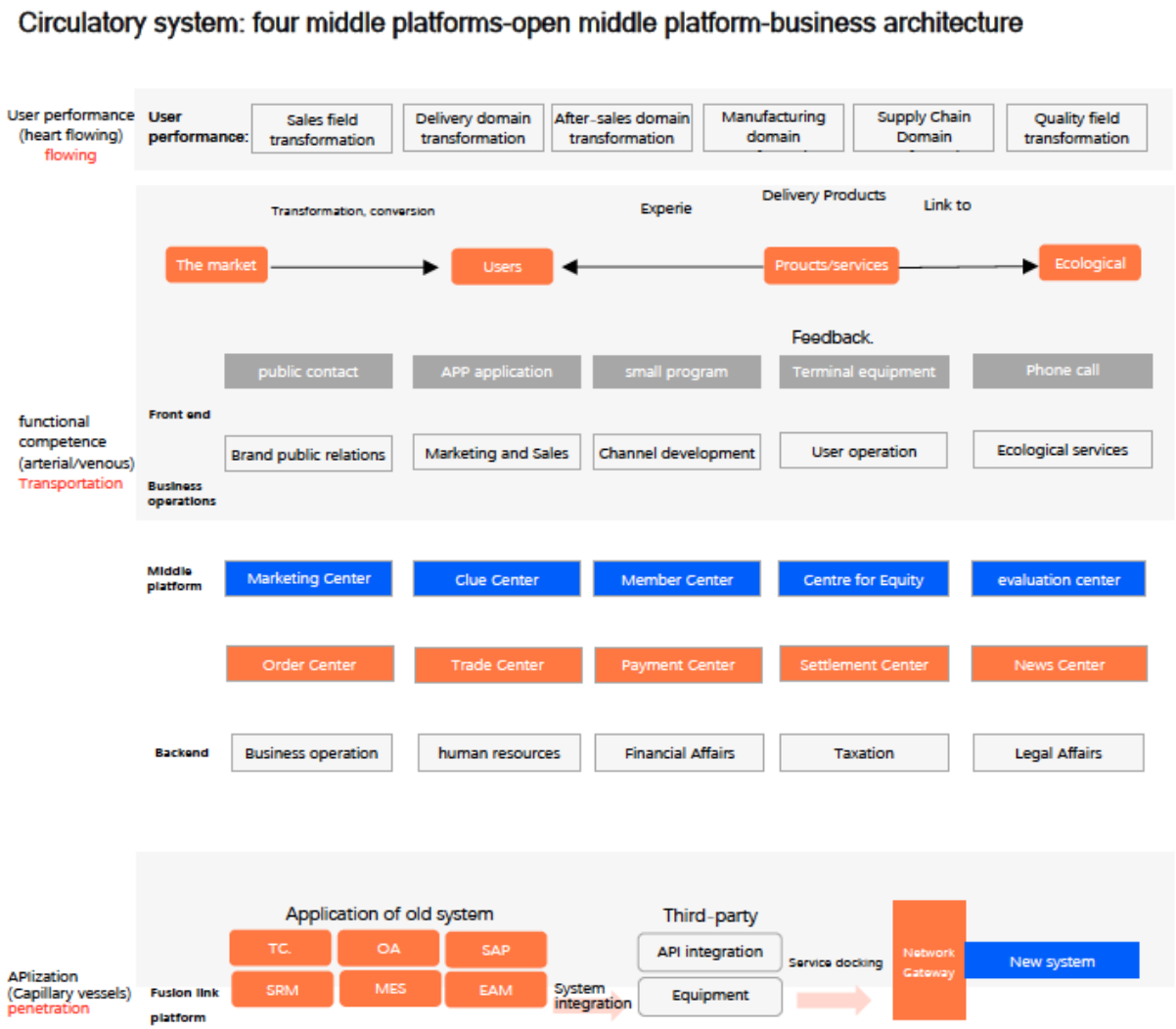

Fig. 4. The digital schematic diagram of the circulatory system
Source: Authors' diagram based on data from this study

Secondly, the role of immune cells is to identify and eliminate abnormal cells such as tumor cells, dead cells, and senescent cells in the body, and prevent normal cells from developing lesions. This corresponds to the application security of the security platform. Application security monitors the access and attack status of each interface in real time. Once there is an abnormality, it will immediately alarm, and the enterprise will quickly enter a state of alert to respond in the first time.

Finally, the main function of immune organs is to perform immune defense. They eliminate foreign objects, antigens, microorganisms, bacteria, viruses, etc. through judgment, which is the self-defense of the body against external substances. This is like the security of our security platform. We organically integrate encryption technology, monitoring technology, defense and repair technology to form a systematic system. This system has the ability to self-iterate and evolve, and can upgrade new defense libraries as the environment changes. In this way, enterprises can be in a safer digital environment and operate stably.

Therefore, it can be seen that the digital transformation of enterprises draws on the healthy gene of the immune system in human genes. By building a powerful security platform, enterprises can protect their information security in all aspects. This not only helps enterprises to deal with various potential threats and attacks, but also improves their stability and resilience. Just like the human body needs to rely on the immune system to maintain health, enterprises also need to rely on the security platform to ensure the smooth progress of their digital operations. The following diagram (Fig. 5) is a schematic diagram of the enterprise immune system.

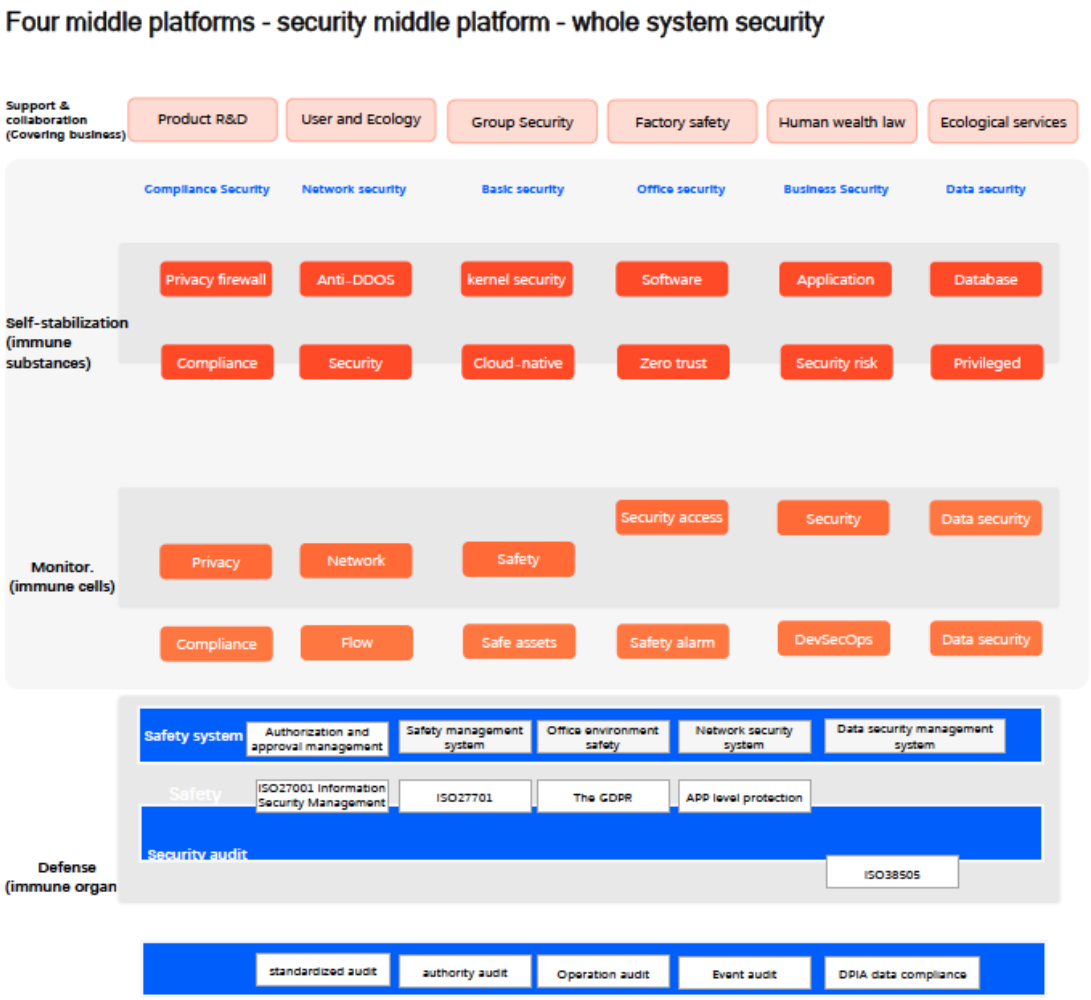

Fig. 5. Diagram is a schematic diagram of the enterprise immune
Source: Authors' diagram based on data from this study

Conclusion

Through the research and analogy of the four genes, we found that human beings, as intelligent life forms, have similarities to the operation of enterprises. Through detailed analysis of several systems, it also gave our enterprise CIO a new way of thinking. Through the analysis and comparison of daily things, our CEO and some non-IT professionals can quickly understand our daily work, and also allow more business personnel to participate in our digital construction, and achieve the goal of digital transformation as soon as possible. This also helps enterprises to better adapt to the constantly changing market environment, improve their competitiveness and sustainable development ability.

Finally, we hope that the digital transformation of our enterprises can draw on more human genetic wisdom to create a more healthy, stable, and flexible digital system, and promote the prosperity and development of enterprises.

References

1. Characteristics of anti-CLL1... 2022 — Characteristics of anti-CLL1 based CAR-T therapy for children with relapsed or refractory acute myeloid leukemia: The multi-center efficacy and safety interim analysis. By Zhang H., Bu C., Peng Z. et al. DOI:10.1038/s41375-022-01703-0. *Leukemia.* 2022, 36(11): 2596–2604.
2. Circulatory System Based... 2022 — Circulatory System Based Optimization (CSBO): An expert multilevel biologically inspired meta-heuristic algorithm. By M. Ghasemi, M. A. Akbari, C. Jun et al. DOI:10.1080/19942060.2022.2098826. *Engineering Applications of Computational Fluid Mechanics*. 2022, 16(1): 1483–1525.
3. Conditional activation of... 2004 — Conditional activation of Akt in adult skeletal muscle induces rapid hypertrophy. By Ka-Man V. Lai, Michael Gonzalez, William T. Poueymirou tt al. DOI: 10.1128/

MCB.24.21.9295-9304.2004. *Molecular and cellular biology*. 2004; 24(21): 9295–9304.

4. Dimon 2001 — Dimon T. *Anatomy of the moving body: a basic course in bones, muscles, and joints*. North Atlantic Books, 2001. 272 p. ISBN: 978-1556432071.
5. Glaiel 2013 — Glaiel F. S., Moulton A. & Madnick S. E. Agile project dynamics: A system dynamics investigation of agile software development methods. *Working Paper CISL#* 2013-05. 2013. Available at https://cams.mit.edu/wp-content/uploads/2013-05.pdf (accessed 2023/12/02).
6. Harari 2012 — Harari Y. N. From Animals Into Gods Summary: A Brief History of Humankind, 2012. Available at https://www.bookey.app/book/from-animals-into-gods. Last updated on 2023/11/17 (accessed 2023/12/02).
7. Jin Weiyong 2022 — Jin Weiyong. Research on the construction of traditional enterprise digital transformation capability system. *Digital Communication World*. 2022; (2):137–139 (in Chinese).
8. Khoury 1996 — Khoury M. J. From genes to public health: the applications of genetic technology in disease prevention. DOI: 10.2105/ajph.86.12.1717. *American journal of public health*. 1996; 86(12): 1717–1722. ISSN:0090-0036.
9. Li Liuying 2021 — Li Liuying. Research on Cyber threat intelligence governance capacity building under digital transformation. *Information Security Research*. 2021(7):632–639 (in Chinese).
10. Lyu 2015 — Lyu Y., Lan Q., & Han S. The Growth genes of open Innovation ecosystem: A multi-case study based on iOS, Android and Symbian. *China Industrial Economy*, 2015 (5): 148–160.
11. Miller 1992— Miller A. D. Human gene therapy comes of age. DOI: 10.1038/357455a0. *Nature*. 1992; 357(6378): 455–460.
12. Narayan 2022 — Narayan D. Platform capitalism and cloud infrastructure: Theorizing a hyper-scalable computing regime. DOI:10.1177/0308518X221094028. *Environment and Planning A: Economy and Space*. 2022, 54(5): 911–929.
13. Wiklund 2003 — Wiklund J., Shepherd D. Knowledge-based resources, entrepreneurial orientation, and the performance of small and medium-sized businesses. DOI:10.1002/smj.360. *Strategic Management Journal*. 2003; 24(13):1307–1314.
14. Wisdom of crowds... 2012 — Wisdom of crowds for robust gene network inference. By D. Marbach, J. C. Costello, R. Küffner et al. DOI:10.1038/nmeth.2016. *Nature methods*. 2012; 9(8): 796–804.
15. Wong 2023 — Wong L. Digital transformation and total factor productivity. DOI: 10.1016/j.frl.2023.104338. *Finance Research Letters*. 2023; 58A:104338.

Список источников

1. Characteristics of anti-CLL1 based CAR-T therapy for children with relapsed or refractory acute myeloid leukemia: The multi-center efficacy and safety interim analysis. By Zhang H., Bu C., Peng Z. et al. DOI:10.1038/s41375-022-01703-0 // Leukemia. 2022, 36(11): 2596–2604.
2. Circulatory System Based Optimization (CSBO): An expert multilevel biologically inspired meta-heuristic algorithm. By M. Ghasemi, M. A. Akbari, C. Jun et al. DOI:10.1080/19942060.2022.2098826 // Engineering Applications of Computational Fluid Mechanics. 2022, 16(1): 1483–1525.
3. Conditional activation of Akt in adult skeletal muscle induces rapid hypertrophy. By Ka-Man V. Lai, Michael Gonzalez, William T. Poueymirou tt al. DOI: 10.1128/MCB.24.21.9295-9304.2004 // Molecular and cellular biology. 2004; 24(21): 9295–9304.
4. *Dimon T.* Anatomy of the moving body: a basic course in bones, muscles, and joints // North Atlantic Books, 2001. 272 p. ISBN: 978-1556432071.
5. *Glaiel F. S., Moulton A. & Madnick S. E.* Agile project dynamics: A system dynamics investigation of agile software development methods. Working Paper CISL# 2013-05. 2013. Available at https://cams.mit.edu/wp-content/uploads/2013-05.pdf (accessed 2023/12/02).
6. *Harari Y. N.* From Animals Into Gods Summary: A Brief History of Humankind, 2012. Available at https://www.bookey.app/book/from-animals-into-gods. Last updated on 2023/11/17 (accessed 2023/12/02).
7. *Jin Weiyong.* Research on the construction of traditional enterprise digital transformation capability system // Digital Communication World. 2022; (2):137–139.
8. *Khoury M. J.* From genes to public health: the applications of genetic technology in disease prevention. DOI: 10.2105/ajph.86.12.1717 // American journal of public health. 1996; 86(12): 1717–1722. ISSN:0090-0036.
9. *Li Liuying.* Research on Cyber threat intelligence governance capacity building under digital transformation // Information Security Research. 2021(7):632–639.
10. *Lyu Y., Lan Q., & Han S.* The Growth genes of open Innovation ecosystem: A multi-case study

based on iOS, Android and Symbian // China Industrial Economy. 2015 (5): 148–160.

11. *Miller A. D.* Human gene therapy comes of age. DOI: 10.1038/357455a0 // Nature. 1992; 357(6378): 455–460.
12. *Narayan D.* Platform capitalism and cloud infrastructure: Theorizing a hyper-scalable computing regime. DOI:10.1177/0308518X221094028 // Environment and Planning A: Economy and Space. 2022, 54(5): 911–929.
13. *Wiklund J., Shepherd D.* Knowledge-based resources, entrepreneurial orientation, and the performance of small and medium-sized businesses. DOI:10.1002/smj.360 // Strategic Management Journal. 2003; 24(13):1307–1314.
14. Wisdom of crowds for robust gene network inference. By D. Marbach, J. C. Costello, R. Küffner et al. DOI:10.1038/nmeth.2016 // Nature methods. 2012; 9(8): 796–804.
15. *Wong L.* Digital transformation and total factor productivity. DOI: 10.1016/j. frl.2023.104338 // Finance Research Letters. 2023; 58A:104338.

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