Analysis of Strategic Layout of "Whole Ecosystem of Human × Car × Home" of Xiaomi and Its Impact on Future Development

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Abstract. Xiaomi announced the strategy of "Whole Ecosystem of Human × Car × Home", and released the core system of the strategy named Xiaomi Hyper OS in October 2023.Compared with the previous system, Xiaomi Hyper OS optimizes its performance, reconstructs its subsystems, performs better than Android's native kernel on high-computing devices, and can achieve system reconstruction, cross-end intelligence, intelligent thinking and global security functions. Xiaomi released the Xiaomi 14 Ultra at its first major press conference in the Year of the Loong, which also has a wide range of layouts in the field of smart home. Xiaomi SU7 is expected to be mass-produced and launched in the first half of 2024. The strategy will further enhance the market share and brand influence of Xiaomi company, enhance user stickiness, and provide users with a more convenient and intelligent life experience. At the same time, the strategy of "Whole Ecosystem of Human × Car × Home" has injected new impetus into China's science and technology industry, and has a far-reaching impact on promoting China's independent innovation capability.

Keywords: Strategic Layout, Human × Car × Home, Xiaomi Inc., Xiaomi Hyper OS

1   Introduction

Lei Jun, the founder of Xiaomi Inc., officially released the Xiaomi Hyper OS and announced the latest strategy of Xiaomi Group, which upgraded from "Mobile phone x AIoT" to "Whole Ecosystem of Human × Car × Home" at the Xiaomi Hyper OS and Xiaomi 14 series new product launch event On October 26, 2023. Xiaomi held its first"Whole Ecosystem of Human × Car × Home" new product launch event, which launched the highly anticipated Xiaomi 14 Ultra and further showcased its grand blueprint for the "Whole Ecosystem of Human × Car × Home" strategy On February 22, 2024. At this press conference, Xiaomi laptops, Xiaomi tablets and other businesses have successively launched flagship products, all of which are equipped with Xiaomi's Hyper OS upon leaving the factory, providing an advanced intelligent experience

experience that runs through the entire scene of "people, cars, and homes". As more new members are equipped with Xiaomi's Hyper OS, the advanced experience of initiative and connectivity will cover more and more scenarios [1]. Xiaomi Group President Lu Weibing stated that 2024 will be the year when Xiaomi's "full ecosystem of people, cars, and homes" will be fully launched. Under the strategy of "Whole Ecosystem of Human × Car × Home", Xiaomi comprehensively connects the three major scenarios of people, cars, and homes through advanced technology and experience, and drives the industrial chain through Xiaomi's Hyper OS, creating a super intelligent ecosystem centered on people and actively serving them. This article will take this as the background and focus on exploring Xiaomi's strategic layout of "Whole Ecosystem of Human × Car × Home" and analyzing its impact on future development.

2   Connotation of Strategy of "Whole Ecosystem of Human × Car × Home": Complete Closed-Loop

"Whole Ecosystem of Human × Car × Home" comprehensively opens up the three scenes of people, car and home through the Xiaomi Hyper OS ecological operating system, realizes the seamless connection and real-time collaboration of hardware equipment, and at the same time, drives the industrial chain partners to create a super intelligent ecosystem that is people-centered and actively serves people [2]. It has become a trend for mobile phone manufacturers to build a whole ecosystem to attract users to buy different types of devices. Xiaomi has been moving towards this goal since it released the "Whole Ecosystem of Human × Car × Home" in 2021. Xiaomi's strategy of "Whole Ecosystem of Human × Car × Home" aims to integrate the three major areas of personal mobile computing center (mobile phones, computers, tablets, wearable devices), mobile smart space (cars) and smart living space (smart home devices) to provide users with a comprehensive and integrated intelligent experience. " Human" is the personal mobile computing center, including each person's mobile phone, computer, tablet and wearable device; "car" is the mobile intelligent space; "home" is the intelligent living space, which is connected by a large number of intelligent devices to provide a complete intelligent life experience. With the finalization of the last piece of jigsaw puzzle, the automobile business, Xiaomi's "Whole Ecosystem of Human × Car × Home" has been completely closed [3].

Xiaomi insists on user-centered, providing more intelligent and personalized services with the help of AI, making the interaction between users and devices more natural and convenient, which is the core of its scientific and technological concept [4]. The company insists on the research and development of underlying technology and long-term investment, forming a deep "fusion technology stack" to drive product innovation and industry progress. In terms of open cooperation, Xiaomi actively cooperates with industrial partners to build a full-link "industrial ecology", promote a more open and inclusive operating system and ecosystem, pool multiple innovative resources, and accelerate the development of the industry. The upcoming smart car is a key step in the closed-loop of "Whole Ecosystem of Human × Car × Home", which

marks the deep layout and active exploration of Xiaomi in the field of intelligent, electric and networked vehicles, and is expected to bring new growth points and competitive advantages. Xiaomi's strategy of "Whole Ecosystem of Human × Car × Home" reflects its foresight and execution in intellectualization, interconnection and openness. Through the joint efforts of comprehensive layout, user center, technology-driven, open cooperation and smart car layout, Xiaomi is expected to maintain its leading position in the future and actively promote the continuous innovation and development of the industry [5].

3   Core of Strategy of "Whole Ecosystem of Human × Car × Home": Xiaomi Hyper Os

"Whole Ecosystem of Human × Car × Home" is a super intelligent ecosystem that comprehensively opens up the scenes of people, cars and homes, realizes real-time collaboration of hardware equipment, and drives industrial chain partners to create "people-centered, active service to people". Xiaomi Hyper OS is the core of the strategy of "Whole Ecosystem of Human × Car × Home".

3.1   Birth of Hyper OS

From the beginning of Xiaomi, Xiaomi company began to develop MIUI. MIUI is not only based on the improvement of Android native system interaction layer, but also has gone deep into the Linux kernel at the bottom of the system, and has made a lot of "magic changes" in the system framework, performance scheduling and kernel capabilities. For example, in 2013, Xiaomi introduced a process alignment wake-up mechanism, which is half a year ahead of Android, and a runtime rights management to protect user privacy, which is nearly three years ahead of Android. With the first launch of IoT business, Xiaomi's research and development of embedded systems has become more and more in-depth. In order to solve the fragmentation and connection gap of the device system in the IoT network, Xiaomi released the connection protocol for IoT devices in 2014. In 2017, Xiaomi's self-developed Vela OS was officially released. In order to flexibly adapt to all kinds of intelligent hardware products, Vela OS is scalable and cuttable, supports all kinds of devices from simple to complex, and begins to gradually unify the IoT device ecosystem. At present, the installed capacity has reached more than 20 million units. In 2016, Xiaomi began to develop cross-end application framework. In 2019, Xiaomi company began parallel research and development of pure self-developed general system Mina OS, and small-scale production verification on some products, while successfully running on mobile phones in the laboratory, some of the technical achievements have also been integrated into Xiaomi Hyper OS. In 2021, Xiaomi started the research and development of locomotive OS. At the beginning of 2022, Xiaomi decided to unify the software architecture of MIUI, Vela, Mina and locomotive OS. Since then, the underlying merger of Xiaomi's operating system has been completed. More than 5000 R & D teams, and after two years of polishing, Xiaomi Hyper OS came into being,

thus opening the "Whole Ecosystem of People, Cars and Home" [6]. The birth process of the Hyper OS is shown in Figure 2. Xiaomi Hyper OS is composed of application layer, cross-end layer, service and framework layer, kernel layer and hardware layer. The cross-end layer includes a distributed subsystem, a cross-end service framework subsystem, a cross-end common capability subsystem, a cross-end application framework subsystem, and a cross-end security subsystem. The birth process of the Hyper OS is shown in Table 1.

Table 1. The birth process of the Hyper OS

Year	Mobile phone operating system	Embedded operating system	Fully self-developed operating system	Locomotive system
2010	MIUI was born			
2014		IoT Device Connection Protocol Release		
2016			Research and development of cross-end application framework	
2017		Self-developed Xiaomi Vela OS.		
2019			Self-developed Xiaomi Mina OS.	
2021				Xiaomi car OS start
2022	Unify the software architecture and complete the bottom merging of the operating system			
2023	Xiaomi Hyper OS			

3.2   Functional Characteristics of Hyper OS

System **reconfiguration.** Xiaomi Hyper OS optimizes its performance, reconstructs its subsystems, performs better than Android's native kernel on high-computing devices, and can better schedule the kernel on lightweight devices. Xiaomi Hyper OS supports advance memory allocation and timely memory recovery, which can improve the continuous startup speed and background resident capability of applications. Xiaomi Hyper OS reconstructs the file system, and after 50 months of continuous use, the I/O performance will hardly decay, and it can reduce the storage pressure of lightweight devices. Solve the network stuttering and disconnection problems in multiple scenarios (such as weak network and high latency), and improve the peak bandwidth of WLAN; Xiaomi OS is compatible with common storage types, 200 + processor brands, and thousands of SKUs, and can flexibly configure the firmware size according to the hardware situation [7].

Cross-end **connection.** Xiaomi Hyper OS realizes the function of "Coss-end Connection" by carrying Xiaomi Hyper Connect. All kinds of equipment can be dynamically networked in real time and presented in the form of a converged equipment center [8]. The sorting between devices changes in real time with the user's status, and quick control can be achieved by clicking. "Cross-end Connection" can connect the devices around it into a whole, so that applications can call hardware capabilities across devices. For example, in a PC video conference, the rear camera of the mobile phone can be called; when going out to work, the tablet can use the 5G network of the mobile phone, and the cross-device focus notification function can present the important information displayed on the mobile phone on the TV. The Xiaomi Hyper Connect is also open to third-party manufacturers to support more types of smart hardware access.

Intelligent thinking. Xiaomi Hyper OS implants AI model into the system and builds in Hyper intelligent thinking center to provide users with intelligent functions. Xiaoai input assistant can assist the user AI to create text; after WPS takes the user's document, the system can understand the meaning of the text in seconds; AI can turn the user's graffiti into exquisite paintings in seconds; Through natural language understanding, AI image search function enables users to search for images without precise expression. In addition, the system also supports end-cloud integration, supports NPU deployment, and provides a more efficient and secure use experience.

Graphic system. Xiaomi Hyper OS reconstructs the "graphics subsystem", adopts the "sense of life aesthetics" design, and adopts the rounded corner design in the overall situation [9]. The dynamic effect of the system originates from the brilliant stage art, and cooperates with the aesthetic expression of multi-integration to construct a unique sense of life aesthetics. The rendering pipeline adopts a new rendering pipeline, supporting complex rendering effects such as fuzzy color mixing and dynamic glass; the visual effect rendering technology is enhanced, which can truly restore the changes of sunrise and sunset in the weather; the flexible frame optimizes the window interaction, which can adapt to the window size layout of various sizes; Xiaomi Hyper OS supports window controller, which can quickly switch window forms, support independent switching of split-screen windows, and support workbench mode for large-screen devices.

Universal security. Xiaomi Hyper OS has created a universal security system, single-end security through the self-developed TEE security system to achieve a separate processing of sensitive content. Cross-end security uses encryption protocols and end-to-end cross-validation mechanisms to ensure more secure and reliable connections. The cross-terminal authority management function makes the interconnection authority transparent and controllable, and each connection is clearly visible. In addition, the Bootloader unlocking permission of Xiaomi Hyper OS is only open to developers and mobile phone enthusiasts.

4   Strategic Layout of "Whole Ecosystem of Human × Car × Home"

4.1   Smart Phone Business

Xiaomi is the third largest smartphone manufacturer in the world, and its smartphone products are favoured by consumers for their high-cost performance, high performance and high appearance. Xiaomi 14 Ultra (Figure 1) at its first blockbuster event in the Year of the Loong. Xiaomi 14 Ultra, considered to be Xiaomi's most powerful imaging flagship ever, has four cameras with full-focus Leica optics and a second-generation one-inch stepless variable aperture main camera [10]. At the level of computational photography, Xiaomi Image Brain was officially upgraded to Xiaomi AISP, becoming the world's first AI large model computational photography platform. It integrates four independent engine modules of optics, tone, colour and portrait, all of which support AI models. Xiaomi Group invited Zhang Yimou, a well-known Chinese director, to act as the chief director of the image to achieve a comprehensive leap in the image capability. Xiaomi 14 Ultra also launched Xiaomi's self-developed Hyper T1 signal enhancement chip, which enhances the signal by 21% to ensure stable connection over long distances. Xiaomi 14 Ultra, a series of advanced technological innovations, has completed the key verification in the new Xiaomi mobile phone smart factory. It is Xiaomi's first truly mass-produced smart factory, with an annual production capacity of tens of millions of flagship phones.

Fig. 1. Xiaomi 14 Ultra (figure credit:
https://www.mi.com/shop/buy/detail?product_id=19683)

4.2   Smart Home Business

Xiaomi also has a wide range of smart home products, including smart speakers, smart TV, smart air purifiers, smart door locks (Figure 2) and so on. Xiaomi ranks first in the market share of China's smart door lock online channel, accounting for 23.6% of the market. Xiaomi's smart home products are favoured by consumers because of their high-cost performance, intelligence and easy operation. Xiaomi also launched the Mijia Smart Home Platform, which provides users with a smart home control centre to facilitate the management and control of smart devices in the home. Xiaomi pays attention to the design and user experience of its products, and its smart home products usually have a simple and beautiful appearance and an easy-to-operate interface. Xiaomi is constantly introducing new smart home products and features to meet the changing needs of users. Xiaomi smart home products usually have good compatibility and can connect and interact with other brands of smart devices.

Fig. 2. One of Xiaomi's smart home businesses: smart door lock (figure credit: https://www.mi.com/shop/buy/detail?product_id=18649&cfrom=search)

4.3   Smart Car Business

Xiaomi's layout in the field of smart cars is also very noticeable, and its smart car products will be favoured by consumers with the characteristics of high-cost performance, intelligence and electrification. Xiaomi Automobile held a technical conference, and its appearance is shown in Figure 3 on December 28, 2023. Xiaomi SU7 is expected to be launched in mass production in the first half of 2024 [11]. Xiaomi SU7 adopts smooth curve body design, with body size of 4997 mm/1963mm/1440mm and wheelbase of 3000 mm, offering three colours of "Gulf Blue", "Elegant Grey" and "Olive Green". The car is equipped with Xiaomi super motor V6s and silicon carbide high voltage system, using Xiaomi intelligent chassis,

built-in intelligent coupling braking system, Xiaomi Pilot intelligent driving system, and intelligent cockpit system based on Xiaomi Hyper OS. Xiaomi SU7 is expected to use advanced solid-state battery technology, improve battery energy density at the same time, greatly shorten the charging time, it is reported that in the fast-charging mode only 10 minutes can be fully charged 80% of the electricity, to meet the needs of long-distance travel. Xiaomi SU7 adopts Modena technology architecture, claiming that the design goal is to start from one hundred first, only and most patents, and to make a good car with ten times investment. The architecture includes electronic and electrical, electric drive system, battery system, chassis, lower body system, thermal management system and other underlying technology modules.

Fig. 3. Appearance of Xiaomi SU7 (figure credit:

https://weibo.com/ttarticle/p/show?id=2309404988668128395281)

5   Impact of Strategy of "Whole Ecosystem of Human × Car × Home" on Future Development

5.1   Impact on Xiaomi Inc.

Through the strategic layout of"Whole Ecosystem of Human × Car × Home", Xiaomi has not only expanded its business areas, but also demonstrated its strong technical strength and innovation ability. Relying on its own technology accumulation in hardware, software, Internet and other fields, Xiaomi has continuously launched innovative and subversive products, leading to the development trend of intelligent technology, and won wide recognition and praise. Through the strategic layout of "the whole ecology of people, cars and families", Xiaomi has not only expanded its business areas, but also demonstrated its strong technical strength and innovation ability. Relying on its own technology accumulation in hardware, software, Internet

and other fields, Xiaomi has continuously launched innovative and subversive products, led the development trend of intelligent technology, and won wide recognition and praise. Xiaomi's strategic layout of "Whole Ecosystem of Human × Car × Home" not only enhances the company's market share in various fields, but also further enhances the brand influence. With its innovative products and services, Xiaomi has won the trust and support of consumers, established a good corporate image, and become one of the leading enterprises in the domestic and foreign science and technology industry [12]. In the future, with the continuous development of science and technology and the deepening of intellectualization, Xiaomi will continue to expand its business areas, introduce more innovative products and solutions, and help people live a more intelligent, convenient and healthy life.

5.2   Impact on Consumer Life

As an influential technology company, Xiaomi has a remarkable product line and ecosystem in the field of smart phones, smart homes and smart cars. With the continuous development of science and technology and the trend of intellectualization, Xiaomi company, with its unique product concept and innovation ability, constantly promotes the progress of intelligent technology, and is committed to providing users with more convenient and intelligent life experience. In the intelligent ecosystem of Xiaomi company, the connection and interoperability between products are crucial. Through interconnection, information sharing and intelligent control can be realized among different devices, creating more intelligent life scenarios for users. The users can control smart home devices through mobile App to achieve intelligent management of the home environment; Family information can also be obtained through the intelligent vehicle system to realize the planning and control of intelligent travel. The construction of this intelligent ecosystem not only improves the quality of life of users, but also brings users a more convenient and intelligent life experience. Xiaomi's layout and development in the fields of smart phones, smart homes and smart cars have made important contributions to the progress of smart technology. Through continuous innovation and integration, Xiaomi company has created a perfect intelligent ecosystem for users, providing users with a more convenient and intelligent life experience.

5.3   Impact on China's Independent Innovation Capability

Xiaomi Hyper OS is continuing to write a new chapter of independent innovation for China. As a leading technology enterprise in China, Xiaomi has been committed to independent innovation and constantly exploring the frontier of science and technology. The launch of the Hyper OS marks an important breakthrough in the field of Xiaomi operating system and opens up a new path for the independent development of China's science and technology industry. Xiaomi Hyper OS and Huawei Harmony OS have the same path, forming the "double insurance" of the domestic operating system. The self-developed operating system can form a "redundant system", and the common development of the two independent systems

will greatly enhance the reliability of the domestic science and technology industry. At the same time, it will also contribute to further strengthening the independent innovation capability of the domestic science and technology industry. The launch of Xiaomi Hyper OS is a historic moment for both Xiaomi itself and the whole domestic science and technology community. Technology companies such as Xiaomi have brought brilliant results to Chinese consumers. Their success has played a positive role in promoting the development of the whole industry and injected new impetus into China's science and technology industry. As an important part of the domestic technology industry, the launch of Xiaomi Hyper OS has a far-reaching impact on promoting China's independent innovation capability. This once again reflects the determination and confidence of China's science and technology industry to continuously develop and innovate, and indicates that the historic moment of China's science and technology industry transition may be coming.

6   Conclusions

Xiaomi's strategic layout of "Whole Ecosystem of Human × Car × Home" aims to create an intelligent ecosystem to provide users with a full range of intelligent life experience. Xiaomi's layout in smart phones, smart homes, smart cars and other fields will have an important impact on its future development, including expanding market share, improving user stickiness, and injecting new impetus into China's technology industry. However, Xiaomi is also facing fierce market competition and technological challenges, and needs to constantly innovate and improve product quality to maintain its leading position in the field of smart ecosystem.

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