Digital Infrastructure: a Framework for the Incremental Evolution of the WeChat Platform

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Abstract. Since its birth in 2011, WeChat has evolved from an instant messaging software to a digital ecosystem that integrates socialization, entertainment, and content. This paper introduces a platform power perspective, which is no longer limited to the interaction between the platform and end-users, but rather positions WeChat as a large-scale commercial organization or infrastructure with close ties to its partners. Combining historical analysis, we explore the historical framework of the platform's progressive evolution from both technical and economic dimensions: firstly, we examine how WeChat continuously expands the platform's boundaries by leveraging programmability, and then further embeds itself in other markets by establishing partnerships, including horizontal industrial diversification, vertical partner incentives, and advertising ecology, and ultimately acquiring both technological and economic infrastructural attributes. By combing the expansion of WeChat's boundary resources and the shifting of WeChat's self-positioning, it is demonstrated that WeChat is not a digital revolution per se, but rather an incremental evolutionary journey that has lasted over a decade.

Keywords: microsoft platform; digital infrastructure; incremental evolutionary framework.

1   Introduction

Born on January 21, 2011, WeChat has evolved from instant messaging software to a digital ecosystem of social networking, entertainment and content. Based on the Internet and telecommunication carriers, WeChat can quickly send voice, video, graphics and text. It can also share streaming media content and use service plug-ins such as circle of friends and public platform. In recent years, WeChat has become increasingly sophisticated and comprehensive, covering all aspects of people's lives in China. As of the third quarter of 2023, WeChat and WeChat had 1.336 billion combined monthly active accounts, providing almost full coverage of the Chinese population.

The research framework of WeChat in this paper is divided into two parts. (i) the technological dimension, which views the platform as a programmable technological artifact and an extensible coding library[1], and the introduction of the concept of technological boundary resources[2]. This concept refers to technical and social resources, which typically consist of a set of application programming interfaces (APIs), software

development kits (SDKs), and reference documentation. Specifically, platforms coordinate and manage third-party development by providing technical building blocks, coding instructions in the form of developer documentation, and terms of service that govern platform development. These resources enable third-party developers to integrate platform resources and design products and extend applications, helping to stabilize the platform architecture until it is upgraded to a mobile ecosystem. (ii) Commercial dimension, introducing the Multisided Market Theory[3], which views WeChat as a large-scale commercial platform that interacts closely with other partners and hosts multiple independent but interconnected applications. With the support of existing technology, WeChat continues to cultivate new partners, markets and audiences, injecting platform dependency in other areas and ensuring its long-term development.

By building digital infrastructure, WeChat caters to a wide range of stakeholders and connects billions of users, enabling technological expansion and economic growth. It should be noted that the key driver of the WeChat platform is the dynamic and ever-changing digital infrastructure rather than the large number of end-users. Therefore, it is extremely instructive to study the dynamic evolution of the WeChat platform.

2   Technical Dimension: the Extension of the Boundaries of the WeChat Platform

WeChat's boundary resources are bundled in a software development kit (SDK), which contains a series of APIs and components to help third-party developers build applications, and is an important entry point for platform boundary extension. In order to study the programmability of WeChat and the expansion of the platform boundary, this paper utilizes historical data from the WeChat Open Platform (WOP) and WeChat Public Platform (WPP) to obtain archival information and sort out the development history.

The WeChat Open Platform was launched in January 2012 to provide interfaces for third-party mobile programs for APP WeChat Authorized Login and WeChat Payment, as well as to enable users to share the content of third-party programs to WeChat. The platform specifically includes Resource Center, Management Center and Account Center, covering mobile application development, website application development, public account development and third-party platform development. The most important of these is the Resource Center, which is WeChat's official documentation, including frameworks, components, SDKs, APIs, return codes, etc., for small programs, small stores, public numbers, etc., to help third-party developers quickly capture data and develop products with the highest efficiency.

In 2012-2019, WeChat's development focus has always been on the WeChat Public Platform. In August 2012, the WeChat Public Platform was launched, including development tools for service numbers and subscription numbers, reference documents, etc. In November 2016, small programs (including small games) were launched, which became the new development focus. At the beginning of the launch, WeChat public platform mainly provides advanced interfaces, SDK, data statistics, etc. With the development of WeChat's functions, the WeChat public platform was also updated to add other functions such as WeChat payment and WeChat small store. The birth of the WeChat

Public Platform formally initiated the platformization process, providing third parties with two key assets of WeChat: (1) the social graph, which contains some of the individual end-user data. (2) standardized technology, including WeChat's APIs, query language, SDK development kits, and reference documents. These two key assets help third-party developers easily access platform data and functionality, build applications, and gain access to deep integration on WeChat. Similarly, the launch of the WeChat Open Platform extends the development domain to websites and third-party platforms. With this, WeChat has officially evolved into a digital infrastructure that creates a platform for interaction between consumers, content developers and other small and medium-sized businesses, and advertisers.

While providing border resources, WeChat launched the WeChat Open Community in 2012 to provide developers with official development tutorials and build a space for developers to ask questions and answer questions and communicate with each other, covering applications such as small programs, WeChat Pay, and enterprise WeChat etc. After that, it successively launched hardware open platform, expression open platform, AI platform *Tencent Cloud Xiaowei*, WeChat dialog open platform, *Donut* development platform, etc., to further enhance the development efficiency and reduce the development threshold.

The evolution of the platform's programmability boundary resources provides technical support for the expansion of the platform's architecture and is the underlying logic for the platform's expansion into other domains and markets. Platformization not only refers to platform extension and decentralized data capture, but also emphasizes the interrelationship between platform technology evolution, digital infrastructure and economic vision[4]. Therefore, on the basis of exploring the technological dimension of the platform, this paper continues to explore the partnerships established by WeChat and its expansion into other domains from the economic dimension (or business dimension).

3   Economic Dimension: WeChat under Tencent's Open Strategy

This paper introduces Multi sided Market Research, which refers to the multilateral market of digital platforms, where the platform not only connects multiple economic actors, but also continuously promotes interactions between the actors to balance the multi-dimensional transaction pattern[5].

Under the influence of Tencent's open strategy, WeChat's multilateral market is an all-encompassing integration system, including horizontal integration (industrial diversification) and vertical integration (incentive policies for partners in niche areas and advertising ecological cooperation).The WeChat platform draws on a variety of distributed boundary resources to regulate organizational relationships with new, flexible means to achieve a balance between a high degree of decentralization and automatic coordination of platform activities[6].

The construction of digital infrastructure in the technical and business dimensions are synchronized: business expansion is the purpose of technical construction, and technical facilities are the basis for business development.

3.1   Horizontal Integration: Industrial Diversification

Horizontally, WeChat's eco-partners are attached to various technology platforms, such as the WeChat public platform and the WeChat hardware platform. It is manifested in two paths: (1) through the third-party interface, directly connecting to other online partners. (2) With the help of the WeChat hardware platform, offline devices log in the WeChat account, and establish a cooperative relationship with the developers.

WeChat public platform as the most important partner contact platform, WeChat open a series of interfaces to it to help enterprises better access WeChat and provide services. In the decade that followed, WeChat public accounts were constantly updated, no longer focusing on graphics and text, but building a WeChat ecosystem with a trinity of public numbers, small programs and video numbers that swept through every field in China. As of 2022, the number of WeChat public numbers is above 20 million, covering enterprises, media, government organizations and individuals from all walks of life.

Also in 2013, WeChat Pay put forward the rules for the establishment of partnerships - no revolution, just tools. WeChat attracts many merchants by binding bank cards and providing product purchase entrances, serving a variety of online and offline scenarios. WeChat Pay also provides a series of operating partner programs, hardware partner programs, and targeted landing programs such as WeChat Payment Score to enhance digital wind control capabilities. As of June 2023, WeChat Pay has more than 100 million monthly active users and an annual transaction volume of 100 trillion yuan.

The WeChat hardware platform, on the other hand, aims to connect things with people and things with things. By connecting WeChat to hardware such as sports equipment and health equipment, it realizes intelligent communication between WeChat and the equipment. The developer partners of WeChat hardware platform include Broadcom, RFSTAR and 31 other companies, and the platform itself has also established cooperative relationships with DJI, Readme, insta360 and other companies. In addition to the above partnerships, with the help of third-party interfaces and a series of APIs based on LBS, almost any APP can access the WeChat platform, share it with WeChat friends and the circle of friends and realize merchant navigation within WeChat. In 2022, the WeChat ecosystem will derive employment of 46.18 million.

Unlike social software such as Facebook, WeChat connects the full spectrum of Chinese people's lives and establishes partners not only with businesses, organizations and institutions, but with countless individual users. In other words, whether it is a medium or large enterprise, a small or micro enterprise, an individual merchant, or an individual user, all of them can establish various forms of partnerships with WeChat. Overall, WeChat's horizontal partnerships are characterized by industrial diversification, multiple types of cooperation targets, and full coverage of influence.

3.2   Vertical Integration: Partner Incentive Policy and Advertising Ecology

In 2014, Tencent Open Platform proposed an early-stage project incubation plan to the whole industry - the Double Hundred Plan, which relies on Tencent system resources such as WeChat, QQ, and Application Treasure to support entrepreneurial teams by means of traffic injection and key business cooperation. At the fund level, in 2017, the Tencent Global Partner Conference released the Tencent Interest Content Fund (TOPIC Fund), which focuses on entrepreneurial projects in the early stage of the content field, such as content producers and MCN organizations.

At the resource level, the WeChat Open Platform is fully open to content partners. It builds an expert group centered on Tencent executives, heads of core business parts, and product and technology professionals to provide pre- and post-investment services for Vthe selected projects. At the same time, in the Double Hundred Program, Tencent cooperates with more than 30 first-tier investment institutions, such as IDG Capital, to open a green channel for two-way recommendation. Until 2018, Tencent's Double Hundred Program has supported 100 startups with a market value of more than $300 billion, and successfully incubated five listed companies.

WeChat's latest partner program places more emphasis on advertising cash. In the public number ecosystem, creators only need to open up the position of the text and the bottom of the text, and WeChat's advertising team can systematically recommend the most suitable advertising content to users, open up the function of commodity shopping guide articles, and open up the mutual selection advertising account system and the advertising system of the circle of friends, so as to lower the threshold of advertisers' advertisement placement. The video number ecosystem has launched a new creator share program, including the *original rights and interests* support function and the paid subscription function for high-quality creators. The former refers to the original statement of high-quality content, will be able to enjoy a series of original rights and interests, including the share of advertising in the comment area, original content platform protection, the platform distribution priority recommendation, etc., and the latter will support the creators to set up a paid content area, the user through the payment of a monthly fee to become a member. In the future, WeChat will go online with MCN's counterpart settlement ability, so that MCN organizations can help WeChat video number creators grow. In 2023, the realization scale of the small program grew by more than 90%, and WeChat paid close to tens of billions of dollars in advertising shares for developers.

WeChat Pay and Enterprise WeChat are constantly updating their partner encouragement and support policies, and the cash flow modes of the apps in the WeChat ecosystem are constantly being optimized, the threshold of cooperation is constantly being lowered, and the commercial value is constantly being upgraded.

4   Conclusions

This paper empirically analyzes the evolution of the technological and economic infrastructure of the WeChat platform through relevant historical data, and examines how it

is eventually transformed into a commercial entity through a programmable architecture that then establishes cooperative relationships with other partners. Specifically, in the technical dimension, WeChat binds boundary resources to the WeChat Open Platform, WeChat Public Platform, etc., which provides technical support for the expansion of applications within the WeChat ecosystem, and is also the underlying logic for the expansion into other fields and markets. In the economic dimension, WeChat integrates an all-encompassing multilateral market system, including horizontal integration (industrial diversification) and vertical integration (segmentation partner incentive policies and advertising ecological cooperation). The most important feature is that the expansion of technological resources is the basis for partnerships, while partnerships are not limited to enterprises and organizations, but can be established with every user.

This paper finds that WeChat did not initially possess infrastructural attributes, but rather, after it became a mobile social software, it developed its technical architecture to accommodate the needs of different stakeholder groups and derived corresponding functions based on its large user base and traffic pool. However, from the perspective of political economy, this form of cooperation creates a monopoly of platform power on the one hand, and also facilitates the platform to avoid the responsibilities and risks associated with the industry.

As a result, we need more historical platform research to try to break the market monopoly of platforms such as WeChat. Most leading social platforms, however, have detailed archives and follow similar development trajectories, i.e., operating development platforms and partner programs. Empirically studying and comparing the technological architecture and functional changes of different platforms helps us to better grasp the characteristics and patterns of platform technological innovations, as well as to better adapt to the ever-changing mobile Internet era.

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