

## Three-Tier Functional Area System: Wuhan Inventory Exploring the Implementation of Renewal Planning

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**Abstract:** Wuhan City, in its early practice of old city renewal, found that fragmented renewal often led to the dispersal of resource allocation, fragmentation of urban construction and other drawbacks, especially due to the over-emphasis on the project's own "economic balance", and in the process of implementation, it also gradually exposed the problems of too large a proportion of residential units, the intensity of which is on the high side, and the lack of public services and ancillary facilities. In order to cope with the above contradictions, Wuhan City, combined with the practice of urban renewal, has gradually constructed a functional area renewal system with three spatial levels: "functional area" as a carrier to promote the urban strategic function gathering; "renewal unit" as a carrier; and "renewal unit" as a carrier to promote the urban strategic function clustering. The "renewal unit" is a unit that guides the investment of public resources within the unit and coordinates various construction activities; the "implementation lot" is a handhold that guides the specific investment attraction and the actual construction of the project. It introduces the background and connotation of the three-tier functional zone system, systematically introduces the mechanism of planning and implementation of functional zone renewal in Wuhan, and puts forward the "centralized piece-type" and "unified vacating-type" based on the different ways of disposing of "people-land-house". Based on the different disposal methods of "people, land and houses", three types of functional area renewal modes are proposed, such as "centralized piece-type", "unified vacating-type" and "remediation and upgrading-type", and targeted planning focus and implementation characteristics are proposed for different modes, so as to form a differentiated and replicable renewal practice experience, which will hopefully provide a reference for similar urban renewal construction. It is hoped that it can provide reference for similar urban renewal construction.

**Keywords:** urban renewal; functional area; three-tier system; planning; implementation guidance; digital platform; chief designer system

The concept of urban renewal was born in the 1970s in foreign city management, and derived from the concept of urban redevelopment, urban rejuvenation and other related concepts<sup>[1]</sup>. 21st century, with the deepening of China's urbanization, a large number of urban renewal research results have begun to emerge in the domestic academic community. In the construction of urban renewal planning system, Liu Di<sup>[2]</sup> takes France, Germany, Japan, Britain and the United States as an example, and extracts the main features of the "three levels and two lines" of foreign urban renewal planning system, i.e., relying on the overall goal at the macro level, the comprehensive renewal plan at the meso level, and the renewal project and action plan at the micro level, to achieve the three levels of planning conduction, and to realize the goal of "improving urban competitiveness". "Enhancing urban competitiveness" and 'safeguarding basic social welfare'. Yan Shuxin<sup>[3]</sup> summarizes the three levels of Chongqing's renewal planning system, i.e., the overall level relies on the central city renewal plan to determine the city's

renewal goals, functional structure, layout, and supporting policies; the subdistrict level relies on the subdistrict renewal plan to delineate the scope of the renewal area, and to judge the dominant functions of the area; and the detailed level through the renewal area planning program to clarify the industrial positioning, the way of renewal, economic indicators, and other specific construction requirements. At the detailed level, industrial positioning, renewal methods, economic indicators and other specific construction requirements are defined through the renewal area planning program and incorporated into the corresponding statutory planning system to guide the practice of urban renewal at different levels.

At the concrete implementation level, the goal of urban renewal in China has also experienced a shift from “pursuing benefits” to “carrying values”, hoping to realize the overall improvement of comprehensive social benefits through urban renewal. Cheng Hui et al.<sup>[4]</sup> take Shenzhen's urban renewal project as an example, arguing that the “growth alliance” formed by the government, market players and rights holders can strike a balance between the implementation of public interests and the “pursuit of economic interests”, and at the same time safeguard the “rights holders' access to reasonable compensation”. “The rights-holders receive reasonable compensation and property dividends”. Shen Shuangting et al.<sup>[5]</sup> summarize the problems of public interests being neglected, serious real estate, and lack of overall coordination in the process of urban renewal in Guangzhou City, and propose that it is necessary to expand from the target to the implementation of comprehensive urban renewal; to achieve the goal of benefiting the people through the construction of a public-private gain-sharing mechanism, to eliminate the social hazards by combining with the whole process of the public participation system, and to ultimately realize the urban renewal through the comprehensive target and other measures. The urban regeneration is realized through measures such as comprehensive objectives, and shifts from single economic objectives to comprehensive objectives of high-quality development. By analyzing the dilemmas faced by Shanghai, Hangzhou and other central cities in the Yangtze River Delta in the implementation of urban renewal, Yin Weina et al.<sup>[6]</sup> argue that a tripartite collaborative governance structure among the government, the market and the society should be established, and that the government should pay attention to the improvement of the governance tools that prioritize the public interest, the market should formulate the policy supply to stimulate the market vitality, and the society should establish a consultation mechanism that guarantees the participation of the society. It can be seen that existing empirical studies<sup>[7-11]</sup> often focus on coastal or first-tier cities, based on typical projects to explore the roles of different subjects in the decision-making process of urban renewal projects, but there are few systematic summaries and summaries of the construction of the urban renewal planning system in central China, as well as the differentiated interactions of multiple subjects such as the government, the market, and the rights holders in the decision-making process of urban renewal in different scenarios.

Wuhan, as a megacity in central China, has entered the era of stock construction, and by 2020, the city's central urban area will have demolished a total of about 117 million m<sup>2</sup> of building area and vacated 153.6 km<sup>2</sup> of land <sup>[12]</sup>. Along with the deepening of stock renewal, urban renewal in Wuhan is also facing new challenges such as increased difficulty in demolition, higher renewal costs, and narrower financing channels. At the same time, at the planning level, Wuhan City used to rely on the statutory planning system of “control detailed planning” with “review management” as the core, which lacked the arrangement of the construction path,

construction sequence and construction subject, and it was often difficult to guide the specific regeneration in a targeted way <sup>[13]</sup>. Construction. At the level of implementation and construction, urban renewal usually involves multiple departments, and the current vertical “line” mode of departmental work also often leads to “fragmentation” in concrete implementation and fails to form effective synergy. In addition, the traditional fragmentation of old city renewal has also gradually exposed the dispersion of resource allocation, the focus of urban development is not prominent, the city image is not prominent and other objective problems. Therefore, it is particularly important to build an innovative grading system by combining the characteristics of stock renewal. Against this background, Wuhan has gradually explored a focused and targeted approach to urban renewal centered on functional districts, in order to implement regional and national development strategies and improve the quality of urban space.

## **1 Background and Connotation of Wuhan's Three-Tier Functional Area System**

### **1.1 Background and development stage**

#### **1.1.1 Early exploration (before 2013)**

Wuhan's “functional area” was gradually conceived and put forward in combination with the practice of urban renewal, and before 2013, it was the preliminary exploration stage of this concept. At that stage, the targets of urban renewal were mainly urban villages and old factories in the central city, and the mode of renewal was based on self-renovation, supplemented by consolidated reserves, and the land supply was based on both “raw land” and “ripe land”. Due to the over-emphasis on the “economic balance” of the market in the renewal work at that time, problems such as large volume and high intensity of residential construction, dispersed urban construction, insufficient attention to historical preservation and the lack of planning and arrangement of strategic urban functions and public welfare facilities have been gradually exposed in the transformation practice. In response to the above problems, Wuhan City has also explored systematic renewal activities in some areas, targeting at a large piece of territory, and promoting the relative agglomeration of urban functions and the comprehensive improvement of environmental quality through unified planning and implementation of construction, whose representative projects include Wuhan Tiandi and Shouyi Plaza.

#### **1.1.2 Pilot Practice (2013-2019)**

2013-2019 is the pilot practice phase of Wuhan's functional zones. 2013, Wuhan was listed as a pilot city for urban low utility land redevelopment, and in the same year, the city put forward the goal of “building a national central city” for the first time, in order to reduce the negative impacts of the market's development behaviors on the public interest, and to avoid the negative impacts of different sectors in urban regeneration, such as the “urban renewal” of different sectors. In order to reduce the negative impact of market development behavior on the public interest and avoid fragmented construction by different departments in urban renewal, Wuhan City, on the basis of preliminary exploration, proposed to promote the “construction of a national central city” by taking key functional zones as a starting point to guide the renewal activities systematically, promote the city's strategic functions and major projects, and strengthen the city's regional economic leadership. To promote the strategic functions and major projects of the city by systematically guiding the updating activities, and to strengthen the leadership and radiation of the regional economy of the city. In order to promote the centralization of urban construction funds, project investment and other factors, Wuhan City

selected nodes in the central city with convenient transportation, abundant land stock and superior resource endowment as pilot areas, and the renewal mode was based on the unified levy and reserve, with high-level planning to coordinate the reserve, construction, investment and operation. During this period, Chuhe Han Street was built, and the key functional areas under construction include Wuchang Riverside Business District and Hankou International Riverside Business District, which greatly strengthened the city's economic radiation function.

### **1.1.3 System construction (after 2019)**

After 2019 is the stage of system construction of functional areas in Wuhan. During this period, the difficulty of renewal and reconstruction in Wuhan increases, and the traditional renewal method cannot be effectively promoted. At the same time, the concept of urban renewal has been transformed from “demolition and retention” to “retention, demolition, construction and control”. Wuhan City in the key functional areas on the basis of the pilot to expand its connotation, from the emphasis on “industrial, economic” functions, to “ecological, cultural, livelihood, historical preservation” and other areas of extension, the object of renewal has gradually expanded to the central city of the old districts, historic districts, The targets of renewal have also been gradually expanded to old neighborhoods, historic districts and villages in the central city. The focus of renewal has also shifted from “highlighting economic construction and realizing regional radiation” to “highlighting the characteristics of urban landscape and enhancing the city's cultural soft power”. 650 old districts in the city have been renovated since 2019, and the reconstruction of Tumhualin, Qingdao Road, Donghu Daxing, and Donghu Dazhong have been completed. Qingdao Road piece, Donghu Dali Village, Qingshan Riverside Park and other comprehensive renovation projects, which have gained the continued attention of the public and received a good social effect.

### **1.2 Connotation of Functional Area**

Since Wuhan's urban construction has shifted from incremental expansion to stock optimization, it has been proposed to designate a number of functional zones to promote land storage, planning and construction as a whole, in order to avoid the drawbacks of single urban renewal projects that caused an excessive burden on the city's public services and municipal facilities in the past, which is essentially a holistic construction mode beyond the “zoned land”<sup>[13]</sup>. By systematically deploying and arranging the industrial layout, architectural space, ecological network, and facilities within the scope of the project, in order to realize the carrying of major national or regional strategies, the clustering of core functions, the improvement of environmental quality, and the enhancement of the well-being of the residents.

### **1.3 Construction of Functional Area System**

In terms of spatial scale, Wuhan's functional zones can be divided into three levels: functional zones, regeneration units and implementation lots (Figure 1). Functional zones are areas with strong industrial synergies, relatively centralized functions, highly interconnected transportation and municipal facilities, and a certain scale of stock of land parcels. Functional zones serve as a platform for the implementation of municipal strategies, highlighting the tangible hand of the government in guiding the improvement of urban functions and quality construction. Functional zones in the city can be divided into business, industry, culture and tourism, ecological and other types according to their functions, among which the functional zones in the main urban areas are mainly for modern services, trade circulation, culture and tourism, international exchanges, etc., with a scale of 3-5km<sup>2</sup>; and the peripheral new towns are

mainly for industry, new town construction and ecological recreation, with a scale of 5-10km<sup>2</sup>. The scale of peripheral new towns is 5-10 km<sup>2</sup> for industrial functions, new town construction and ecological recreation<sup>[14]</sup>. In order to strengthen the guarantee of land use for carrying strategic functions, the functional area is often divided into several renewal units in the process of concrete implementation, one of which is a relative concentration of stock of land parcels, and can be carried out as a whole to renew the construction of the geographic scope. Generally speaking, the area of potential plots in the renewal unit is not less than 50% of the total area. The scope of the unit is defined in combination with the urban road network, community boundaries and natural features, etc. The size of the unit is based on the location and existing conditions. The size of the unit is based on the location and the degree of completion of the current situation, ranging from 0.1-0.5 km<sup>2</sup> in the central urban area, and from 1-3 km<sup>2</sup> in the new town and peripheral townships and villages, and is the spatial carrier for focusing on the strategic intent of the urban area, implementing the urban construction plan and investment promotion, and is the implementation platform for the coordinated promotion of the work on the district and departmental levels. The implementation lot is the physical space corresponding to the parcel or block of land for the specific investment projects in the actual work. As a node project invested by the government platform and enterprises, the implementation lot is a concrete handhold for centralizing government and social capital investment and realizing the planning intention and demands of all parties. Implementation lots are divided into demolition type and remodeling type according to the renewal method.

## **2 Wuhan City, three-level functional area planning and implementation of conduction**

### **2.1 Organizational structure: “1+1+1” leading organizational structure and multi-departmental linkage to form a synergy of promotion.**

The construction of functional areas often involves the plans and projects of many departments, such as development and reform, land, planning, gardening, urban construction, etc., and involves the division of labor and collaboration of many departments, so a functional area needs a strong lead to coordinate the implementation plan of each line.

In order to strengthen the coordination of the area, Wuhan City in many years of functional area practice, explore the use of “1 responsible body”, “1 implementation body”, “1 planning team” of the “1+1+1” organizational structure. Among them, “a responsible body” is mainly responsible for planning the core functions of the functional area, organizing the preparation of functional area planning, coordinating the functional area investment, land supply and various construction work. In order to fully mobilize the enthusiasm of regional development, the district government in the jurisdiction where the functional area is located is generally the responsible department, and individual functional areas set up management committees or commands, which are specifically responsible for the coordinated coordination of the construction of the functional area, investment promotion, and infrastructure facilities<sup>[15-16]</sup>. “One implementation body” is to specify a storage body or platform enterprise, specifically responsible for the functional area of land storage, infrastructure construction, park greening, investment docking and other specific work. “1 planning team” is led by a technical department, joint high-level design team to systematically complete the planning preparation, and in the later planning and implementation process to do a good job of technical support and tracking services.

In addition, in order to promote the effective connection between the municipal and district levels of government, the preparation of high-caliber, grounded planning, Wuhan City often

adopts the “district government + Planning Bureau” mode to establish a regular urban joint working meeting system, and regularly carry out research and promote the deployment of the functional areas of the planning, construction, and people's livelihoods. In the planning stage, planning is used to solve the various problems facing the development of the area, and to integrate the interests of many parties to reach a consensus; in the centralized construction stage, the horizontal interdepartmental coordination is strengthened, and the progress of different facilities is coordinated to form a synergy of interdepartmental promotion.



Fig.1 Relationships of functional zones (Hankou International Riverside Business District), renewal units, and project lots

## 2.2 Planning: urban design as the main body, special projects as support, forming a unified implementation program

Since functional zones contain multiple ownership units in a limited spatial unit and involve multiple interests, a unified planning consensus is an important prerequisite for avoiding fragmentation and disorganization of urban construction. In addition, as a geographical unit where strategic functions of the city are concentrated and economic activities are concentrated, functional zones are often characterized by high-intensity development and three-dimensional composites in terms of facilities and space, and the preparation of their planning often involves many professions such as planning, architecture, transportation, ecology, municipal, underground space, and economy, etc., and thus the integration of multidisciplinary planning results is also an important means of integrating various types of facilities and clarifying spatial relationships. See Table 1.

After years of exploration, Wuhan City has gradually constructed the planning content of “industry+space+facilities” and the corresponding results system of “industry planning+urban design+specialized planning”. Among them, the planning focuses on solving major propositions such as district positioning, development goals and industrial system, which can be prepared in



priority or carried out in parallel with other plans. Due to the “dynamic” nature of urban development, planning also needs to be combined with macro-economics, superior planning, investment docking and other real-time dynamic amendments. Special purpose is to clarify the functional area ecological, functional, transportation, municipal and other facilities and systems of the external interface and internal system construction, the specific content can be based on the current situation of the area and the implementation of the characteristics of a comprehensive determination, the preparation process should be strengthened with the horizontal linkage of the functional departments, the integration of the area infrastructure, landscaping, public services and other construction activities. Urban design for industrial functions, livelihood support, ecological media, transportation and municipal elements to provide a spatial carrier, through the various types of functional business, facilities, elements, etc. in the spatial integration, coordination of each other in space and time sequence of the contradictions, and ultimately form a unified construction of the main body of the urban design “blueprint”.

规划体系 功能区	城市 设计	产业 策划	专项规划							
			绿地 系统	交通 专项	市政 专项	公服 专项	地下 空间	生态 治理	历史 保护	其他
杨春湖高铁商务区	●	●	●	●	●	●	●	●		立体空间、绿道专项、海绵专项
杨春湖东片	●	●	●	●	●	●		●	●	地铁车场复合专项
谌家矶地区	●	●	●	●	●	●	●			防洪专项
汉口国际滨江商务区	●	●	●	●	●	●	●			低碳专项、江水源能源站专项设计等
汉口历史风貌区	●	●				●			●	融资模式
鼓架文旅生态休闲区	●	●	●	●	●	●		●		绿道专项

Tab.1 Overview of planning system for selected functional zones in Wuhan

### 2.3 Conveyance Mechanisms: Processes and Paradigms Relying on Statutory Planning and Administrative Approvals

In order to ensure that functional zones move from “vision” to “implementation”, Wuhan has gradually explored a set of processes and paradigms relying on statutory planning and administrative approvals (Fig. 2) to ensure that the intent of planning is carried out and to realize the transition from “preparation” to “management” and from “technology” to “system” of functional zones. This ensures the implementation of planning intentions and realizes the connection and leap from “preparation” to “management” and from “technology” to “system” of functional zones.

At the macro level, municipal functional area planning and overall urban design are synchronized with the city's territorial spatial planning. The municipal functional zone plan delineates functional zones within the city, defines the general scope of the functional zones and their dominant functions, and serves as a programmatic document for guiding the city's public

investment, investment attraction, industrial development, and urban renewal. The overall urban design is a comprehensive study of the city's overall spatial characteristics and spatial order framework, and defines the characteristics of each functional area. The core contents of the above two plans are incorporated into the territorial spatial planning and serve as a superior basis for guiding the planning and construction of functional areas. All districts can also simultaneously prepare district-level functional area plans and district-level overall urban designs, which will refine the guiding and controlling requirements and provide feedback on the development concepts and aspirations of the districts.

At the meso level, the overall urban design and all kinds of special projects shall be compiled on the basis of functional zones, so as to realize the boundary scope, dominant functions and landscape features determined by the higher-level planning. The overall urban design of functional zones will be compiled by the Municipal Land Planning Bureau and the district government, and the detailed controlling plan will be compiled simultaneously, which will be used as the legal basis for the administrative approval of the zones after examination and approval. The scope of preparation of the overall urban design of the functional area can be one or more adjacent functional areas, and the boundary can be reasonably optimized by combining the status quo and potential sites.

At the micro level, the urban design of the lot is compiled on the basis of the renewal unit and the implementation lot, which is fully to the market and mobilizes the enthusiasm of enterprises. As the functional area of the overall urban design content for the land layout, public space and other systematic framework, design depth, investment articulation and other factors are not enough to guide the specific construction, and the traditional control regulations tolerance is relatively insufficient, the project is not targeted. Lot urban design can connect the systematic requirements of the overall urban design from the top, and connect the investment promotion, engineering construction, land ownership and other factors from the bottom, guiding the implementation of specific projects and solving all kinds of contradictions, which is the refinement of the overall urban design of the functional area and can be used as a basis for guiding the formulation of planning and design conditions of the land parcels (Fig. 3). The delineation of lots is differentiated according to the renewal mode. Areas adopting the unified acquisition and reserve mode can be comprehensively delineated on the basis of the renewal unit and the physical boundaries of railways and arterial roads, etc.; areas favoring retention and micro renewal are delineated on the basis of the autonomous scope of the grassroots community. The urban design of the lot can be organized and compiled by a diversified body, and the core points are included in the planning and design conditions. In addition, key lots should also prepare intentional architectural plans, which can be included as an annex to the planning and design conditions, so as to realize the "fine" control of key lots through "listing with plans". The above levels are not unidirectional transmission from top to bottom, and the lower level can also provide feedback to the upper level, so as to balance the government's "active intervention" and the market's "flexible guidance".



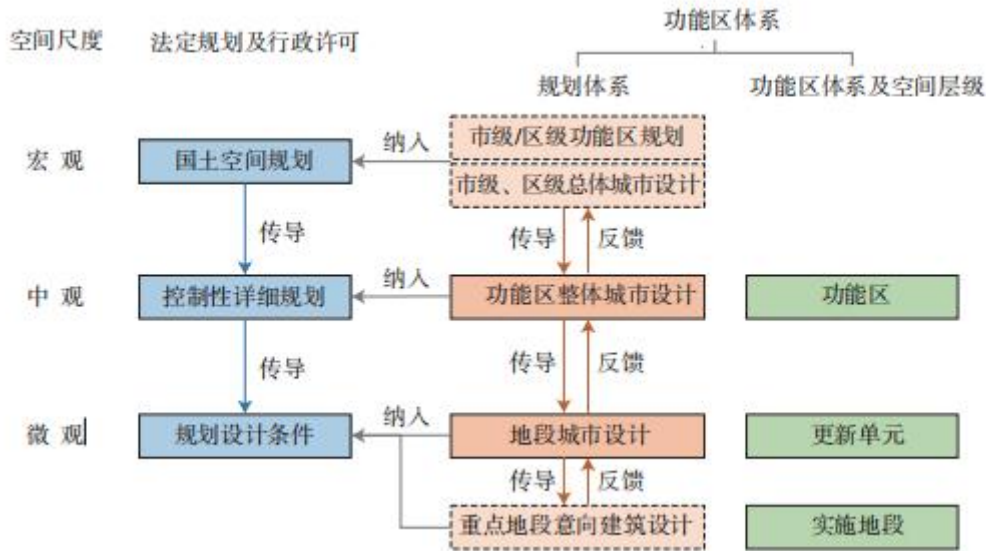


Fig.2 Vertical transmission and feedback mechanism of functional zone system in Wuhan

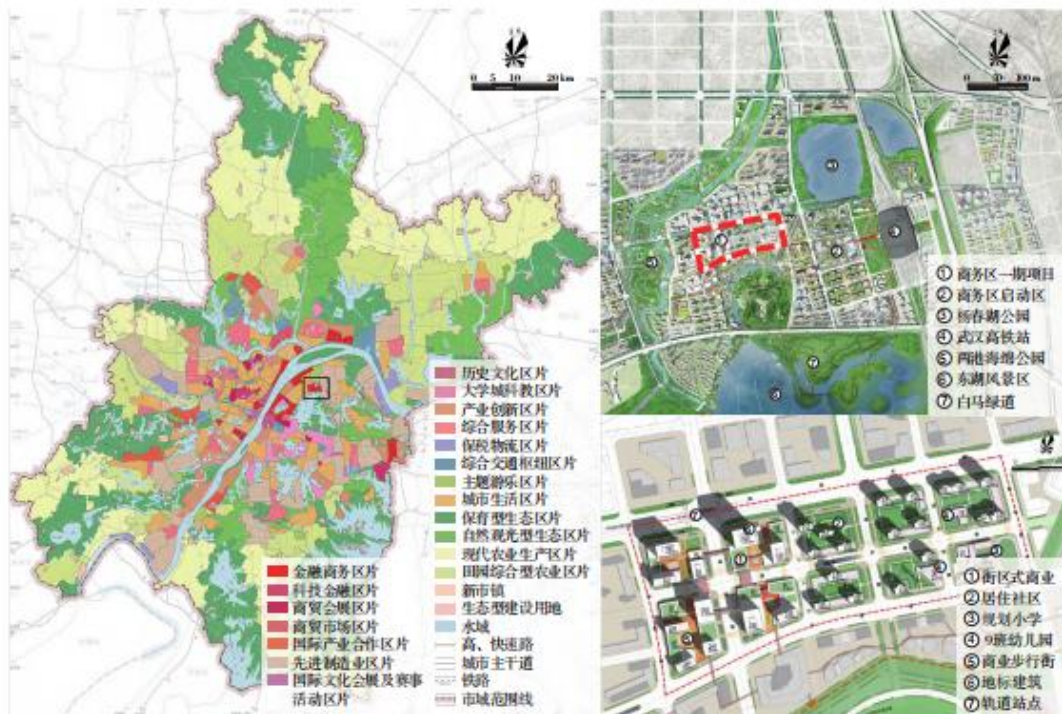


Fig.3 The planning system for functional zones at different spatial scales

#### 2.4 Technical support: building a digital platform to intervene in all aspects of the planning and management of functional zones.

In order to avoid the disadvantages of “experience” and arbitrariness that existed in the past, Wuhan explored and constructed a digital simulation platform in the process of functional area planning and management, and at the same time formulated operational procedures to intervene in the preparation of functional area planning, program review, land supply, and building construction and other aspects of the platform's application. See Figure 4.

In the overall urban design preparation stage of the functional area, the intelligent assessment and crowd planning modules of the digital platform are utilized to carry out the

assessment of the current facilities, public willingness research, draft plan solicitation and public opinion feedback, etc., to collect the public willingness, carry out the scheme comparison analysis<sup>[17]</sup>, check the contradictions of various types of facilities in the spatial vertical system, and assist the planning and design through the quantitative analysis and simulation simulation; in the pre-trial stage of planning review, the upper level is used as a basis for the planning and design. In the pre-examination stage of planning review, parameters such as upper planning requirements and standards are loaded, so that quantitative evaluation of upper planning compliance, green space coverage, service level of public service facilities, and traffic accessibility of the area can be carried out, and output through visualization<sup>[18]</sup>. In the results review stage, the 3D simulation module of the platform is utilized to display the results and pre-set the demonstration path to provide an immersive experience and feeling of being in a virtual urban public scene; in the land supply stage, the intelligent evaluation of planning and the 3D simulation module can be utilized to carry out a comprehensive evaluation of the implementation of the urban design of the lot and the architectural scheme of the key lot to the upper plan, the level of public services, etc.; in the review stage of the architectural scheme, the evaluation can be transferred simultaneously to the building scheme review stage, and the evaluation can be carried out at the same time. At the stage of building plan review, the urban design plan of the lot can be accessed at the same time, and the matching degree and difference between the construction plan and the urban design of the lot can be displayed in the form of a multi-window (Figure 5); at the stage of implementation supervision, a dynamic quantitative analysis platform is constructed to implant a monitoring module for indicators of convenient transportation, human environment, ecological livability, and urban resilience to display and supervise the implementation of the plan in real time in a diagrammatic and tabular form, and cooperation is carried out with platforms such as Baidu, Gao De, and others. At the same time, it cooperates with platforms such as Baidu and AutoNavi, utilizing the support of open-source data to analyze the tangible space of project construction coupled with the intangible information of crowd activities, and to comprehensively assess the integrated effects of construction projects. Among them, the evaluation of the service level of planning green space and public service facilities in the pre-trial stage of planning review, and the three-dimensional simulation simulation in the review stage of land supply and architectural program are “required actions”, and if the evaluation is not in line with the previous planning or standards and norms, the next stage of the review will not be carried out. By embedding the use of the technology platform into the planning, management and implementation stages of functional areas, it reduces the interference of human subjective factors in planning and management, and assists in scientific and reasonable decision-making.

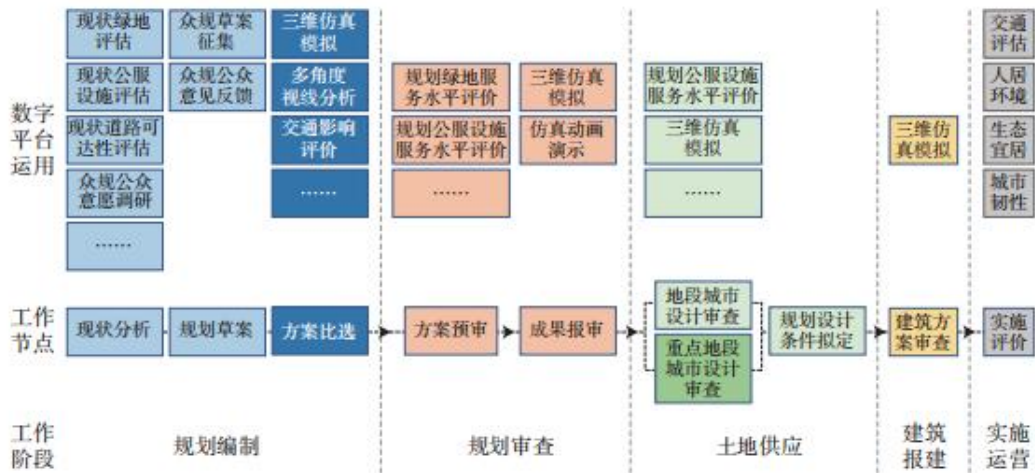


Fig.4 The digital platform used in the functional zone planning and implementation

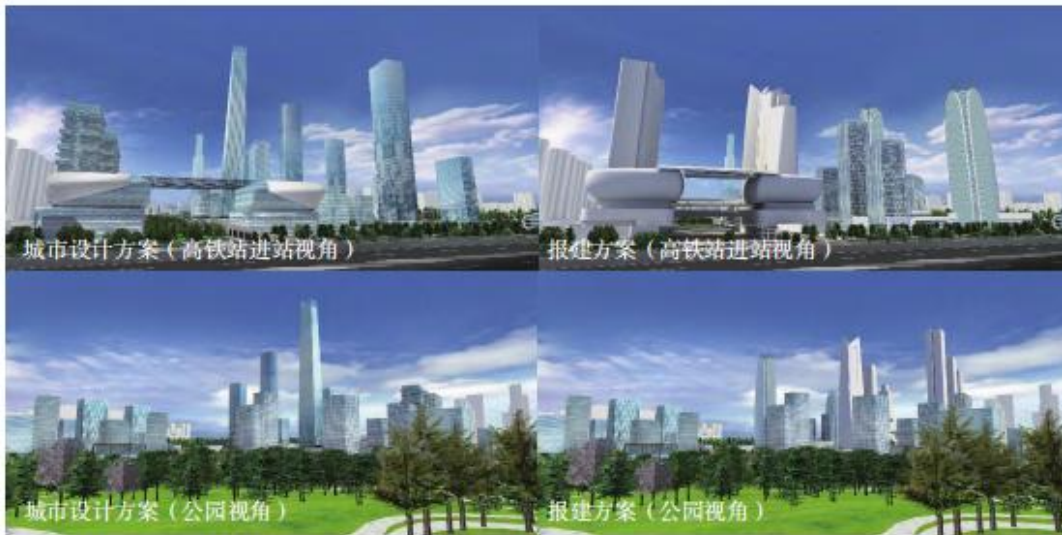


Fig.5 Multi window display of differences between development proposals and urban design during the period of con-struction permit application

**2.5 Implementation Guarantee: Utilizing a team of chief engineers to continuously serve the entire life cycle of functional zones.**

As a typical stock development and construction area, functional area is characterized by diversified interests, complex facilities system and uncertain market factors, which invariably increase the cycle of planning and construction, and objectively require the in-depth intervention and long-term tracking service of a planning and technical team.

Wuhan City in the early functional areas to explore, has put forward “1 + N” technical workstation model, that is, by the functional area planning agency as a technical platform, while the formation of the project's technical team and coordination group, which: technical team is mainly responsible for planning and design and other technical work; coordination group is responsible for technical docking, daily contact, planning review and approval, planning publicity, investment promotion and other matters. The coordination group is responsible for technical interface, daily liaison, planning review, planning publicity, investment promotion and other affairs [14].

In order to ensure the “positive transfer” of the design intent after planning approval, and to ensure the effective connection of the subsequent enterprise-based architectural design to the urban design, Wuhan City promulgated the “Wuhan Key Functional Areas Chief Designer System (Trial Implementation)”, based on the experience of Beijing's Responsible Planner and Shanghai's Chief Planner Team System, and in combination with the practice of long-term planning for the functional areas. Designer System (for Trial Implementation)”, which specifies the generation, responsibilities and assessment mechanism of the chief designers of key functional zones. Among them, the generation of chief designers follows the previous method of being undertaken by the urban design preparation organization (applicable to areas where the overall urban design of the functional area has not been prepared), and further adds that for areas where the urban design has been completed, such forms as public bidding, single-source procurement or competitive negotiation are adopted, and that industry influencers and leaders are encouraged to take part in the management and implementation of planning for the functional area. The duties of the chief designer are extended to the front-end to the preparation of planning on the basis of administrative approvals such as planning review, land supply and building construction, and to the back-end to the implementation of construction, operation and management, etc., with an emphasis on guaranteeing the effective connection between subsequent architectural design management and urban design, so as to avoid the disconnection between the later construction and the earlier planning. In addition, the system also specifies mechanisms for performance evaluation, assessment, rewards and punishments for chief designers to promote high-level design, high-quality construction and refined management of functional zones, and strengthens the whole life cycle control of functional zones from planning to construction and operation.

### **3 Three Modes of Functional Area Renewal in Wuhan**

According to different current conditions, reserve modes, renewal methods and other factors, Wuhan City classifies functional area renewal modes into three categories: centralized piece-type, unified vacating-type and remediation and upgrading-type. Concentrated piece type is the main renewal mode of the early functional areas as the original rights and interests and physical environment within the area are changed more thoroughly; unified vacating type only changes the original rights and interests and preserves the physical environment to the maximum extent, which is more often used in historical districts, old factories and other areas of deep historical and cultural heritage; remediation and upgrading type is to improve the quality of the area's public service facilities under the premise of not changing the original rights and interests and the physical environment, which is more often used in historic districts, old factories, etc, The remediation and upgrading type, on the premise of not changing the original rights and interests and physical environment, improves the quality of public service facilities, ecological environment, etc., and is mostly applied to old neighborhoods, scenic areas, etc., where there is little land in stock, strong ecological constraints, obstacles in terms of property rights and policies, serious debts in facilities, and a relative lack of market momentum. At present, as Wuhan enters the stage of stock enhancement, the renewal mode is also showing a transition from the centralized patchwork type to the latter two types and the co-existence of the three types. See Table 2.



### 3.1 Centralized and piecemeal type: Important urban nodes highlighting strategic functions and regional function leadership.

The centralized piece-type mostly adopts a piece of reserve and planning and construction method, reserving sufficient bearing space for major investment projects, strategic functions and forward-looking industries. Due to the favorable location conditions, good resource endowment, relatively strong industrial atmosphere, and systematic industrial planning and continuous investment docking in the pre-planning stage, this type has the strongest market momentum. Therefore, the centralized piece type is the main type of Wuhan City, the early exploration of the pilot functional zone, the site is located in the city's sub-centers, hub areas, industrial parks and other important nodes of the city, the industry is mostly financial, trade and logistics, equipment manufacturing, science and technology R & D and other functions, highlighting the strategic function of the leading and regional functional leadership. Representative areas include Hankou International Riverside Business District, Yangchun Lake High-speed Railway Business District, Wuchang Riverside Business District, Guiyuan Slice, and Central China Financial City.

更新模式	模式特点	主要分布	实施特点	规划重点	代表功能区
集中成片型	对片区范围内原有权益关系及物理环境改变得较为彻底,为重大项目、战略功能预留承载空间	多位于城市副中心、枢纽地区、产业园区等城市重要节点	统一储备的一级土地整理模式,“封闭化”运营保障资金建设	战略功能导入、生态网络构建、设施体系集成、立体空间设计	汉口国际滨江商务区、杨春湖高铁商务区、武昌滨江商务区、归元片、华中金融城等
统一腾退型	仅改变原权益关系,对物理环境进行最大限度保留	多分布于历史街区、老旧厂房等历史文化底蕴深厚地区	政府主导整体招商,平台企业统一收储建设,三级市场参与运营,打通“一二三级市场”实现综合平衡	产业策划深度服务项目“全生命周期”,物质空间规划旨在提升城市魅力品质及文化软实力	汉口历史风貌区的吉庆街片、三阳设计之都片、武昌县华林片以及汉阳龟北汉阳造等
整治提升型	在不改变原权益关系和物理环境前提下,对片区公服设施、生态环境等进行提升	多位于历史欠账较多的老旧小区,受到集体土地所有制制约的乡村地区,以及生态环境敏感的生态地区	政府主导,引入多元主体拓宽多元化资金来源	围绕原住民需求,对民生设施补短板,“微创式”手法活化场所空间	青山青翠苑小区、汉口历史风貌区长安社区、东湖风景区大李村等

Tab.2 Renew implementation characteristics and planning focuses of different functional zones in Wuhan



Fig.6 Series planning of Yangchun Lake High Speed Rail Business District

### **3.1.1 Implementation characteristics: unified levy reserves to ensure piecemeal development, and “closed” operation to guarantee capital construction.**

This kind of functional area often adopts the unified levy and reserve method to carry out overall reserve, unified planning and centralized construction, so as to make room for the introduction of major investment projects and strategic functions. In order to guarantee the funds for land acquisition and infrastructure construction in the functional zones, these functional zones mostly adopt the “closed management” method, and the proceeds from land transfer can be prioritized to be used for infrastructure construction in the functional zones after deducting the national and provincial accruals.

### **3.1.2 Planning Focus: Introduction of Strategic Industrial Functions and Integration of Systematic Complex Facilities System**

In order to facilitate the concentration of core strategic functions, the centralized piece-type functional area lays out all kinds of functions and facilities in a systematic and composite manner, realizing the diversified values of economy, society and ecology. The planning focuses on the introduction of industrial functions, the construction of ecological networks, and the integration of facility systems.

Yangchun Lake high-speed rail business district located in the northeastern gateway to the main city of Wuhan, for example, the business district, relying on Wuhan Station, is located in the country's second largest city lake on the north shore of East Lake, east of Wuhan's old iron and steel base WISCO, is currently in the compilation of Wuhan's national land and spatial planning to determine the hub-type urban sub-center. However, the development of the business district has been lagging behind for a long time, which is reflected in the weak foundation of industrial functions, deteriorating ecological environment, relatively backward facilities, and lack of distinctive spatial characteristics. In view of the above contradictions, the plan carries out “positioning and industrial planning”, “urban design”, “underground space”, “eco-governance”, “living area”, “ecological management”, “ecological management”, “ecological management”, “ecological management” and “ecological management”.”, “ecological governance”, “living area” and other specialties and designs (Figure 6). In terms of strategic function planning, the plan synthesizes the experience of industrial development in hub areas such as Zuidas in the Netherlands, Hongqiao in Shanghai, and King's Cross in London, combines the node location of the district in the city's industrial circle, and synthesizes the current trend of iterative innovation industry, and comes up with three major types of industrial directions that can be guided by the district; in terms of ecological network construction, combining with the district's superior ecological background conditions, the plan includes In terms of ecological network construction, combined with the superior ecological background conditions of the area, the park greening network of “ecological corridor + large park + node greening” is planned, and the greening land ratio of the business district is as high as 37%. In terms of integration of facility system, planning of underground traffic system, underground comprehensive pipeline corridor, second-level corridor and other facilities, increasing the capacity of ground transportation, carrying out aboveground-ground-underground integrated design, reasonably coordinating the space vertical direction and construction sequence of underground facilities, and solving the contradiction of mutual constraints of the facilities in the layout and schedule; in terms of spatial characteristics, combining parks and rail stations with the layout of cultural, creative and public service facilities and landmarks, reasonably designing the skyline outline of the business district, and integrating



the sight line relationship between Donghu Lake and the city to build The overall construction of the city imagery of “half landscape, half city”<sup>[19]</sup> .

### **3.2 Unified vacating type: realizing industrial upgrading by “exchanging cage for birds”.**

The unified vacating type is mostly located in historical landscape areas, old urban areas, and other areas that are mainly reformed by stock. These areas often have extremely deep historical cultural deposits and superior landscape resource endowments, but are subject to complex property rights and strict landscape control requirements, making it difficult to adopt a centralized and piecemeal approach to renewal and construction. The target of this type of renewal is also “fine” to a building entity, through the centralized vacating of the residents or original rights holders, in order to achieve industrial upgrading and quality improvement. The focus of this type of functional area is mostly on industrial “cage for birds”, public service “short board” and public space weaving. The targets for investment are mostly small and medium-sized enterprises in the fields of cultural creativity, public services, engineering design, and artists' studios.

#### **3.2.1 Features of implementation: opening up “one, two or three levels of market” to achieve comprehensive balance**

Due to the high cost of expropriation, this model is unable to balance short-term investment through market behavior. For this type of functional area, Wuhan City is actively exploring “one, two, three levels of linkage” comprehensive balance, long-term balance and other income and expenditure balance methods, to open up the “one, two, three levels of land market”. The investment promotion link is led by government departments to carry out unified investment promotion, avoiding the drawbacks of homogenization of investment promotion among different owners and their own way of doing things; the reserve link is led by the government platform for the unified storage of land and retained houses into the land “primary market”, and the construction link is led by the platform enterprise responsible for the construction of infrastructure, public space, housing renovation, etc., which is incorporated into the land cost; the operation link introduces the three-tier market; the operation link introduces the three-tier market. In the construction segment, the platform enterprise is responsible for the construction of infrastructure, public space, housing renovation, etc., which is included in the land cost; in the operation segment, it introduces enterprises in the three-tier market, and the enterprise and the platform company sign a lease and operation agreement, so that the enterprise reduces the market risk in an asset-light manner. The government platform obtains sustained rental income, which feeds the capital investment in preliminary reserves, public service support and municipal construction, etc. Through “market operation, risk sharing and government underwriting”, it opens up the links in the “whole chain” of the industry, and realizes multiple benefits for the economy and the society.

Representative areas include Shanghai Village, Jiqing Street, Sanyang Design Capital, Wuchang Tanhualin, and Hanyang Turtle North Hanyang Zaozhuang, which are located in the Hankou Historical Landscape District.

#### **3.2.2 Planning focus: in-depth services for the “whole life cycle” of industries, enhancement of the quality of the city's charm and cultural soft power.**

The focus of this type of functional area lies in the enhancement of industrial functions, the shaping of special cultural and tourism products, the creation of street and alley spaces, and the setting of special paths, so the focus of the planning includes industrial planning, street design,

public art, and pocket park design. Among them, due to the characteristics of “one, two, three levels of market” linkage implementation in this type of functional area, in the industrial planning highlights the depth of services from planning to implementation and operation of the “whole life cycle”: pre-planning stage of the district population, industrial status quo, customer profile assessment, etc., based on the five-year plan of the national economy, annual planning and development of the city. Based on the five-year plan of the urban national economy, annual implementation plan in advance to plan the characteristics of the highlights of the project; planning stage to invite the second and third-tier enterprises to participate in the seminar, synchronized with the economic calculations, balancing the interests of all parties, in advance to avoid the financial risks, digestion of various types of contradictions, and provide enterprises with customized and accurate services; after the implementation of the project, the effect of the construction of the project, the effectiveness of the operation to carry out the implementation of the assessment, summing up the success of the experience, and timely correction of the various problems exposed and After the implementation of the project, we will evaluate the construction effect of the project, summarize the successful experience, and correct all kinds of problems and contradictions exposed in time. Take Jiangnan Road Shanghai Village as an example, the project is located in the core business circle of Wuhan City, Jiangnan Road, adjacent to the rail line station, is the second level of outstanding historical buildings in Wuhan City, the main existence of industrial positioning is not clear, culture and tourism brand image is not prominent, the quality of the space needs to be improved and other practical problems. In terms of industrial function, the residents of the area are taken as the research object in the preliminary planning stage, and the demand characteristics of the people in the area are finely analyzed with the help of big data, so as to precisely lock the industrial function positioning; the financial indicators such as “net present value” and “internal rate of return” are applied in the planning stage to comprehensively compare the solutions; the investment stage is used to make a comprehensive selection of solutions; the investment stage is used to make a comprehensive selection of solutions. At the planning stage, financial indicators such as “net present value” and “internal rate of return” are used to make a comprehensive selection of programs; at the investment stage, the “super-mix” group investment program is customized to facilitate accurate investment by combining the spatial fragmentation of the project and other characteristics. In terms of spatial transformation, the plan focuses on the revitalization and utilization of street and alley space, highlights the original vitality of the site by guiding the characterization of architectural and public space elements, develops an identifying visual guide system with the regional characteristics of Shanghai Village, carries out activity planning to further strengthen the cultural lineage of the site, and enhances the immersive cultural and tourism experience in the micro-space<sup>[20]</sup>.



Fig.7 Illustration of fine-detailed renovation of buildings and public spaces in Dali Village

### 3.3 Remediation and Enhancement: Pilot Micro-Renewal Explorations Constrained by Land Ownership and Policies

Remediation and upgrading type is usually located in areas where the current situation needs to be improved urgently, and where it is impossible to realize the change of property rights of “house and land” due to policy, economic, environmental and other factors. In centralized construction zones, this type is mostly located in old districts with large historical debts or in neighborhoods or areas with mixed functions that need to be upgraded in historical landscape areas; in addition, this type is also widely distributed in rural areas subject to the collective land ownership system, as well as in ecologically sensitive ecological areas. The remediation and upgrading type is the current pilot area in Wuhan exploring rural revitalization and innovative micro-renewal of old neighborhoods.

#### 3.3.1 Implementation Characteristics: Government-led, Multiple Subjects Introducing Diversified Funding Sources

Restricted by property rights, land policies, financing channels, ecological conservation and other limitations, this type of model is mostly led by the government, with the participation of the original interest holders and the market in a localized pilot, and the spatial scale is also relatively small, highlighting the demonstration effect through the “point to lead the way”. Among them, those located in centralized construction areas often rely on the platform of large-scale state-owned enterprises behind the existing property rights of the land parcel, replace the existing space with industrial functions, improve infrastructure, repair and update housing, and entrust the operation team with market experience to carry out professional management of the later industrial upgrading and introduction of properties, with the source of funds relying on self-financing or the issuance of special government bonds with the help of key projects to achieve a comprehensive balance of economic and social benefits. The source of funding mainly relies on self-financing or the issuance of special government bonds for key projects, so as to achieve a comprehensive balance of economic and social benefits. In areas where urban and rural areas are integrated, especially in rural areas such as villages in the landscape and villages in the green, the project mainly relies on the platforms of district governments or state-owned enterprises to complete the construction of the infrastructure skeleton of the project's outer periphery, the enhancement of the overall style, and the restoration of regional ecology. The renewal of houses within the project mainly relies on village-level organizations to introduce market players to form diversified sources of funding. Representative areas include Qingcuiyuan District in Qingshan,

Chang'an Community in Hankou Historical Landscape Area, and Dali Village in East Lake Scenic Area.

### **3.3.2 Planning Priorities: Supplementing the shortcomings of people's livelihoods, and revitalizing space through “minimally invasive” methods.**

This type of project located in a centralized construction area focuses on service quality improvement, public space renovation, architectural restoration and cultural lineage continuation. Hankou Historic District Chang'an community, for example, the area on the one hand, with rich historical and cultural resources, rich old Hankou living atmosphere and superior ecological resources such as the natural endowment of the river, on the other hand, also faced with the imbalance of land use structure, property rights relationship between the spatial structure of the fragmentation of the old facilities and other prominent contradictions. In view of the above problems, in 2020, taking the opportunity of post-quarantine revitalization, the area has prepared a series of plans such as community governance, urban design, implementation plan, etc., aiming to enhance the service function, living environment and image and style of the area. In terms of service quality improvement, the construction of all-age service facilities and intelligent management system to enhance the service level of public service facilities in the old city;

In terms of expansion of municipal facilities, the comprehensive carrying capacity of the district will be enhanced through optimization of parking and comprehensive renovation of pipeline corridors, etc. In terms of spatial quality enhancement, the fragmented space will be integrated by using the slow-moving travel line, and a slow-moving network combining “characteristic streets and alleys, art plazas, and pocket parks” will be created; in terms of continuation of the cultural lineage, the design of clusters of historical buildings will be adopted, and unique, small-scale cultural experience places will be constructed. In terms of the continuation of cultural lineage, cluster design is adopted for historical buildings, and the construction of featured and miniaturized cultural experience places is carried out to form the core display surface of the new cultural and tourism industry in the area, so as to realize the continuation of the traditional cultural lineage and innovative development<sup>[21]</sup>.

Projects located in urban-rural integration areas focus on livelihood improvement, landscape remodeling, functional innovation, ecological conservation and other areas. Take the transformation of East Lake Dali Village as an example, the village is located in the main city into the core scenic area of the East Lake Scenic Area (Mill Hill Scenic Area) along the main channel Lumo Road, adjacent to the Botanical Gardens, Plum Garden, Cherry Garden and other famous scenic spots, and adjacent to China University of Geosciences and Huazhong University of Science and Technology, and other higher education, with a large suburban tourism market, but there are also complex property rights, transformation of capital difficulties, space clutter, infrastructure debts and other issues. In 2019, with the opportunity of the Wuhan Military Games, the village prepared a series of plans to guide the practice of in situ remediation “micro-remodeling”. Among them: improve people's livelihood, mainly by virtue of the platform company's capital introduction, systematic optimization of drainage and road traffic system in the area, to meet the needs of local residents to travel and hygiene improvement; landscape remodeling focuses on the idyllic landscape of the village to carry out fine micro-restoration, without changing the main structure of the building based on the building façade remediation, and in the design of the signage, street lamps and seating in the integration of local IP, to create

a localized landscape. In terms of functional innovation, based on the existing cultural and creative, ecological and talent resources, it plans to develop the industrial functions of cultural creativity, idyllic leisure and digital creativity; in terms of the implementation path, it aims to explore a “government-led, platform-led, village committee-assisted, multi-participation” implementation and operation mechanism<sup>[22]</sup>, i.e., the implementation and operation mechanism is led by the villagers, cultural and creative museum owners, community members and the local community, with the aim of developing the cultural and creative industry. In terms of the implementation path, it aims to explore a “government-led, platform-led, village committee-assisted, multi-participation” implementation and operation mechanism<sup>[22]</sup>, i.e., the villagers, cultural and creative libraries owners, the community committee and the platform enterprise will jointly form the cultural and creative cooperative of Dali Village, exploring the model of the scenic cultural and tourism complex construction of shared construction<sup>[23]</sup>.

#### **4 Conclusion**

Currently, China has entered the middle and late stages of urbanization, and urban construction has fully stepped into the era of inventory. Existing empirical research focuses on coastal or first-tier cities, and there are few systematic summaries and summaries of the construction and practical experience of urban renewal systems in central regions. This paper introduces the practice of inventory renewal in Wuhan city through the construction of a three-level inventory renewal system of “functional area-renewal unit-implementation lot” to carry out purposeful, hierarchical and focused “active intervention” in urban construction. Active Intervention”. Among them: at the municipal level, to implement the city's overall urban strategy such as the city's territorial spatial planning, and to use “functional zones” as the bearer to gather strategic functions of the city, forming the core spatial carrier for the city's industrial agglomeration and synergy, and for the city's glamor to be manifested; at the district level, to use the “renewal unit” as the unit, and to guide the renewal unit to be implemented. At the district level, the “renewal unit” is used as a unit to guide the input of public elements within the unit, coordinate the layout and construction of various facilities, and serve as a platform for coordination and synergy between the district and departments. Specific implementation links, around the “implementation of the lot” to guide the microeconomic activities of various types of market players, as a specific project to promote investment, engineering and construction of the hand. Around the three-tier functional area system, Wuhan City, also in the organizational structure, planning, guidance mechanism, technical support, implementation of security, etc., and gradually find a city level upgrading, environmental quality, people's livelihood to improve the innovative path. At the same time, based on the “people, land and housing” different disposal methods proposed “centralized piece-type”, “unified vacate-type” and “remediation and upgrading-type”. Based on the different disposal methods of “people, land and houses”, three types of functional area renewal modes were proposed, and in view of the main contradictions of different modes, different reserve modes, forms of intervention of government platforms, and ways of market participation were adopted to explore the characteristics of planning and implementation paths that are adapted to the local conditions.

At the same time, Wuhan has also implemented a series of management and institutional innovations. For example, Wuhan has explored innovative land supply modes such as “above ground and then underground” and “separate red line above the road”. On the one hand, it matches the highly composite features of architectural functions and facilities in functional areas



through layering of concessions, and at the same time, fully reserves flexibility to encourage enterprises to carry out flexible and diversified architectural projects on their own. Encourage enterprises to carry out flexible and diversified architectural designs independently. In rural and ecological areas where there is less land for construction and insufficient market impetus, pilot policies such as “point land supply” have been explored to further reduce the cost of participation and encourage the participation of diversified main bodies in the revitalization of the countryside and the construction of ecological civilization.

Along with the continuous promotion of urban renewal, the construction of functional zones in Wuhan has entered the stage of “systematization and vertical deepening”, and has faced a series of contradictions and difficulties in concrete practice, which need to be continuously explored and practiced in the next stage of work. For example: how to improve the enthusiasm of social capital participation; how to broaden financing channels and break through financing bottlenecks; how to clarify the boundaries of the rights and responsibilities of the platforms at the municipal and district levels, and how to further form a construction synergy; and so on.

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