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# The Vertical Renewal of the Megacity

## 巨型城市的垂直化更新



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### Abstract | 摘要

*This paper elaborates the positive effect and unique advantages of supertall high-rise buildings along with their inherent problems throughout the urbanization of Shanghai, a megacity, against the background of a new round of urban renewal to be initiated there. It avails itself of several successful cases of high-rise building projects designed by the Institute of Shanghai Architectural Design and Research Co., Ltd., before looking into the potential functional vitality, urban space quality, cultural heritage and the dramatic efficiency improvement of urban activities that may contribute to the renewal of a megacity from the perspectives of the vertical development of supertall high-rise buildings, sustainability, composite functions and highly efficient connections. It also explores whether high density supertall high-rise buildings are the inevitable and rational solution for the development of a megacity.*

**Keywords: Fifth Center in Jinqiao, Megacities, Shanghai City Renewal, Shanghai Industrial Center, Vertical Renewal**

本文以上海的新一轮城市更新计划为背景, 结合上海建筑设计研究院设计的超高层工程案例, 紧扣“从城市到巨型城市, 构建高密度的垂直城市主义”的大会主题, 阐述了超高层建筑在上海这座巨型城市的城市化更新进程中发挥的积极作用和独特优势, 剖析其产生的城市新问题。从超高层建筑发展的垂直化、可持续化、功能复合化和高效连接化的视角, 分析超高层建筑在巨型城市的城市更新中, 给城市带来的功能活力、空间品质、文化传承和城市效率的大幅度提升及契机, 并探寻超高层建筑的高密度聚集对于巨型城市发展的必然性和合理性的解决方案。

**关键词: 金桥第五中心、巨型城市、上海城市更新、上海实业中心、垂直化更新**

### Megacity and Shanghai

The concept of the megacity has been widely circulated during the wave of globalization. Normally, a megacity refers to a single city or metropolitan area with a population exceeding 10 million. By the end of 2015, there were 35 cities across the globe whose populations exceeded that threshold, including well-known cosmopolitan cities such as Tokyo, New York and Shanghai. These cities exert a huge impact on the urbanization of their surrounding regions in terms of area and scale, economic impact, social function and urban layout of space.

Shanghai has experienced a continuous wave of construction since its reform and opening policy was adopted (Figure 1). By the end of 2015, Shanghai had a total population of 24.15 million (Zhuang Shaoqin, 2015) and occupied a space of 6,340 square kilometers. Existing high-rise buildings numbered over 30,000, among which 45 exceeded 200 meters. From the perspective of total population, the occupied area of the urban buildings, main urban layout and construction, Shanghai has certainly become a megacity.

### 巨型城市与上海

全球化进程中, 巨型城市的概念被广泛提及。通常意义的巨型城市是指人口数量达到1000万以上的单个城市或城市圈。截止2015年底, 全球共有35个超过1000万人口的城市, 其中包括东京、纽约、上海等国际知名城市。这些城市无论从面积规模、经济影响力、社会职能至城市空间尺度都对周边区域的城市化进程产生巨大的影响。

上海自改革开放以来经历了持续不断的建设热潮(图1), 截止2015年底, 上海总人口已达2415万人(庄少勤, 2015), 面积6340平方公里。已建成高层建筑总数已超过3万栋, 其中超过200米高度的建筑就有45栋之多。从人口数量角度、城市总建设用地规模、主城区空间尺度及建筑尺度各方角度来看, 上海都已成为一座“巨型城市”。

### 上海正面临的“巨型城市问题”

作为国际经济中心、金融中心、航运中心、贸易中心的上海, 与国际上众多巨型



Figure 1. The City of Shanghai (Source: zmt.southmoney.com)  
图1. 上海市 (来源: zmt.southmoney.com)

## The “Megacity Problems” Faced by Shanghai

As an international economic, financial, shipping and trade center, Shanghai, much like many large international cities, is facing various problems throughout its development and construction:

1. Shortage of land resources and irrational land utilization structure, featuring over proportion of industrial land and insufficient land for public facilities and green spaces. By the end of 2015, the city's built-up area was 3,124 square kilometers (Zhuang Shaoqin, 2015), which was more than 45% of the city's land area, drawing near to the planned area of 3,226 square kilometers.
2. Excessive population density, aging population and a plunging birth rate. Since the beginning of this century, Shanghai's population has dramatically increased by 8 million, from 16.08 million in 2000 to 24.15 million by the end of 2015 (National Economic and Social Development Statistics Report of Shanghai 2015, 2016.).
3. Obvious inadequacy of functional vitality. On the one hand, Shanghai faces huge challenges in maintaining its traditional

industrial advantages; on the other, its traditional service sector is under great pressure under the booming new wave of technology and the economy such as with the Internet. In other words, Shanghai still has a long way to go to inject innovation into its economic development.

4. A need for improvement in the quality of urban space. The downtown area is overcrowded with high-rise buildings and has insufficient public open and recreational spaces, with a per capita public green space of only 7.1 square meters (Zhuang Shaoqin, 2015).
5. Insufficient awareness for cultural heritage. The old district reconstruction approach, mainly focusing on demolition and rebuilding, has negatively affected the city's historical style and features. More effort should be put into maintaining the historical flavor and folk culture of Shanghai.

These problems have restricted the development of Shanghai, a megacity, and should become the focus and direction of its continuous urban renewal.

城市一样,在其城市发展建设中正面临着诸多问题:

1. 土地资源紧缺,且土地结构不完全合理,工业用地比重过大,而公共设施和绿地的用地比例偏低。截止2015年底,全市建成区面积3124平方公里(庄少勤,2015),超过市域陆地面积的45%,已逼近规划规模3226平方公里。
2. 人口结构密度过大,人口老龄化、少子化特征日益明显。本世纪以来,上海人口激增800万,从2000年1608万人至2015年底已达到2415万(2015年上海市国民经济和社会发展统计公报,2016)。
3. 功能活力明显不足。上海不仅在保持传统工业优势面临较大挑战,而且在互联网等新科技和新经济背景下,传统服务经济的发展也面临较大压力,创新经济发展任重道远。
4. 城市空间品质有待改善。市中心高层林立,公共开放空间紧缺,城市游憩空间不足,人均公共绿地7.1平方米(庄少勤,2015)。
5. 文化传承关注度不够。以往拆除重建为主的旧区改造方式,使上海城市历史风貌受到冲击。上海在延续历史文脉、留存城市乡愁方面要更加努力。



## Shanghai's City Renewal Plan and Implementation Method

Under the new context, Shanghai faces the urgent problem of how to build itself into an efficient, innovative, compact and vibrant city. Urban renewal, as one of the important ways to alleviate urban problems, will become the new direction for the future development of Shanghai. The aim is to improve urban functions, stimulate vitality, improve the living environment and elevate Shanghai's attractiveness through further saving land use and insensitively utilizing existing land so as to improve the richness of the city's culture and drive innovation under the shortage of urban resources. On May 5, 2015, the Shanghai Municipal People's Government issued the Measures for the Implementation of Shanghai Urban Renewal, with key points as follows:

1. To improve urban functions, strengthen urban vitality and drive innovative development;
2. To improve public service facilities and enhance the community service level;
3. To strengthen the protection of historical styles and features, maintain humanistic connotations and improve urban charm;
4. To improve the ecological environment and strengthen the construction of green buildings and living communities;
5. To improve the pedestrian system to facilitate citizens' life and low-carbon transportation;
6. To increase public open space to encourage communication between citizens;
7. To improve urban infrastructure and security to ensure that citizens can live and work in peace and contentment;
8. To improve other areas that needs to be renewed as regarded by the municipal government.

At the same time, Shanghai emphasizes carrying out this urban renewal in a dynamic, sustainable and organic way based on the following principles: 1. Guidance, planning and leadership from the government. The government shall prepare the renewal plan and play a leading role in guiding its implementation. Regional assessment shall act as an enabler to ensure that overall renewal requirements are met. 2. Quality orientation and public facilities first; this shall be for adhering to a people-oriented principle, focusing on enhancing the quality

and functions of the city, ensuring public elements with priority and improving the living environment 3. Participation and sharing by various stakeholders to build an innovation policy mechanism, guide involvement of various parties and achieve an all-win result. 4. Dynamic management in accordance with the law. This is for taking land contract management as the platform and implementing all elements of total lifecycle management to ensure the effective realization of the renewal objective.

### Vertical Renewal Is an Effective Remedy for the "Chronic Disease" of the Megacity

Under the current circumstance, where land resources are becoming increasingly scarce, the vertical development for urban renewal has become an irresistible trend. A vertical city does not only increase the height and improve the image of a city; it is also an important means of realizing high density and intensive development.

Vertical renewal is a new way of thinking to solve the problem of megacities under the background of urban renewal. It puts emphasis on the construction of high-rise buildings to realize efficient and intensive utilization of land in downtown areas. By encouraging the redistribution of urban public functions, further releasing public open space at lower floor levels and realizing a seamless connection with urban traffic nodes and multidimensional connection at near-earth spaces, super high-rise buildings become the hub for "work, life and culture" in the city. In this way, old city areas are rejuvenated, and the renewal of the city can actually be realized.

Vertical renewal calls for a greater focus on the connotation of urban development, on the role played by high-rise buildings in contributing to the renewal and regeneration of a megacity and on better addressing social problems accompanying development of megacities. The ultimate goal is to create an efficient, innovative, compact and high-density mega-vertical city.

#### 1. Vertical renewal – focusing on vertical expansion of public space; creating a richer space by utilizing less land to save the city's land resources

In the face of expensive land resources and high population density, the city's ground resources become increasingly scarce. More urban life and public space has been distributed to different heights of the building,

这些问题制约了上海——这座巨型城市的发展和更新，同时也成为其不断更新的重点和方向。

### 上海的城市更新计划及实施办法

如何成为一个高效、创新、紧凑而充满生机的城市，是上海在新的时代背景下必须着力解决的问题。而城市更新作为改善城市问题的重要手段，将成为上海未来发展的新方向。上海为适应城市资源环境紧缺下的内涵增长、创新发展的要求，进一步节约、集约利用存量土地，实现提升城市功能、激发都市活力、改善人居环境、增强城市魅力的目的。于2015年5月5日上海市人民政府印发了《上海市城市更新实施办法》，重点如下：

1. 完善城市功能，强化城市活力，促进创新发展；
2. 完善公共服务配套设施，提升社区服务水平；
3. 加强历史风貌保护，彰显人文底蕴，提升城市魅力；
4. 改善生态环境，加强绿色建筑和生态街区建设；
5. 完善慢行系统，方便市民生活和低碳出行；
6. 增加公共开放空间，促进市民交往；
7. 改善城市基础设施和城市安全，保障市民安居乐业；
8. 市政府认定的其它城市更新情形。

同时上海强调实施动态、可持续的有机更新。并注重以下工作原则：一是政府引导，规划引领，政府制定更新计划，以区域评估为抓手，落实整体更新的要求，发挥规划的引领作用；二是注重品质，公共优先。坚持以人为本，以提升城市品质和功能为核心，优先保障公共要素，改善人居环境；三是多方参与，共建共享，创新政策机制，引导多元主体共同参与，实现多方共赢；四是依法规范，动态治理，以土地合同管理为平台，实施全要素全生命周期管理，确保更新目标的有效实现。

### 垂直化更新是解决巨型城市“顽疾”的有效手段

在土地资源日益紧缺的当下，城市更新的垂直化发展趋势更加凸显。垂直城市主义不仅是对于城市高度和城市形象的追求，同样也是实现城市高密度、集约化发展的重要手段。

sprawling toward even higher floors and deeper levels underground. Vertical renewal distributes the functions which traditionally were supposed to be placed on the ground level, such as museums, art galleries, opera houses, entertainment spaces, interactive facilities and even city parks, to different heights of the building. The “public space going upward” trend has become more salient, and super high-rise buildings have evolved into “mini cities.”

Vertical renewal enables the traditional horizontal living system to expand at the vertical dimension, facilitating effective distribution of the city’s public services at a vertical space.

## **2. Vertical renewal – focusing on releasing ground level public space; building a more energetic city, expanding natural landscapes and simulating a city’s vitality**

Le Corbusier proposed the design concept of a “modern city” as early as 1922 and attempted to build a three-dimensional urban public space as follows: 1. Adopt high-rise buildings to maximize building space on limited land; 2. Elevate the ground floor to contribute the ground space to the city’s public or open space; 3. Isolate the motor vehicle and pedestrian system at different layers.

Today, facing overpopulation and extreme shortage of land resources, it has become more imperative than ever before to “release land resources on the ground and create more public space in the city.” Vertical renewal advocates elevating the ground floor and placing different floors at different locations so as to reserve more land for the public and enlarge the city’s green space and natural landscape. The Measures for the Implementation of Shanghai Urban Renewal explicitly encourages appropriately increasing building height to provide space for greenery and contains specified incentive measures.

## **3. Vertical renewal – focusing on consolidating transportation nodes and building a three-dimensional seamless transportation hub to alleviate traffic jams**

Vertical renewal is a process of sorting out a city’s transportation resources. By combining high-rise buildings and traffic nodes, vertical renewal encourages building high-density regional traffic hubs, which should pull together living, work and recreational facilities, all within walking distance. The building therefore becomes more penetrating. The ground floor is divided into several public areas, allowing landscape, light and air to interact and flow smoothly. Well-planned public spaces are

connected with the traffic hubs leading to all directions, thus forming a building complex and turning the three-dimensional traffic network into a reality.

## **4. Vertical renewal – focusing on the sustainability and scalability of functions and resource distribution, allowing for the “possibility” of the changing time**

Shanghai is facing dual challenges in maintaining traditional industrial advantages as well as further developing the traditional service sector in the context of emerging new technologies and economy such as the Internet. More innovation in economic development will become a new focus for its future development. The construction of high-rise buildings shall pay close attention to environmental sustainability and, more importantly, to the requirements of new functions and working patterns in a time characterized by technology and innovation. It shall reserve the “possibility” for continuous change and create various “adaptive spaces” to realize the sustainable development of buildings.

## **5. Vertical renewal – focusing on the three-dimensional connection at near-earth space and unclogging “capillaries” of the city to enhance connection efficiency**

Vertical renewal advocates accessibility to the building from all sides. For the first time, the ground floor is divided into several public spaces to improve accessibility, facilitate the smooth flow of people, landscape, light and air, activate underground floors and enhance and expand the public space. In this way, the building will be able to accommodate various events and recreational and entertainment activities. The building’s style will be more flexible and changeable. The floors can become open, public and connected with each other, improving the quality of public activities and life on each floor.

## **Case Studies**

### **Case 1 – The Fifth Center in the China (Shanghai) Pilot Free Trade Zone (Jinqiao)**

This project is located in Jinqiao, Shanghai’s Pudong New Area. Occupying an area of 340,000 square meters, it is to be built in two phases, comprising of a Technology and Innovation Tower, a 260-meter high-rise building, two Incubation centers (each at a height of 100 meters), and a United Family Medical Research Center – a 60-meter high

垂直化更新,是城市更新背景下解决巨型城市问题的新思路,它强调通过超高层的建设实现城市中心土地的高效集约利用,鼓励通过城市公共功能的垂直化再分配、底层公共开放空间的进一步释放、与城市交通节点的无缝结合、以及近地空间的多维度连通,使超高层建筑成为城市“工作、生活、文化”的枢纽中心,唤醒城市旧区的活力,实现城市的更新。

垂直化更新要求更关注于城市发展的内涵,更关注于超高层建设本身对于巨型城市更新和再生所起到的贡献和推动作用,并进一步解决巨型城市发展的社会问题。力求创造一个高效、创新、紧凑而高密的巨型垂直城市。

## **1. 垂直化更新 – 强调公共空间的垂直化拓展; 用更少的土地创造更丰富的空间, 节约城市土地资源;**

面对寸土寸金的土地资源和人口的高密度,城市的地面资源越来越紧缺,更多的城市生活和公共空间被分配到建筑的不同高度,并向更高的空中和更深的地下拓展和延伸。垂直化更新下的超高层建筑正将我们传统认知的地面功能如:博物馆、美术馆、剧院、娱乐、交流互动、甚至城市公园布局于建筑的不同高度,“公共空间的高层化”趋势越来越鲜明,超高层建筑正逐渐演化为一座小型的“迷你城市”。

垂直化更新真正将传统的水平生活体系,拓展到城市的垂直维度之中,有利于城市公共服务功能在垂直空间的有效分配。

## **2. 垂直化更新 – 强调释放底层城市公共空间; 提升城市活力和扩大自然景观资源, 激发城市活力;**

勒·柯布西耶早在1922年提出的“当代城市”设计思想,就尝试了城市公共空间的三维化:1.即采用高层建筑以在有限土地上创造尽可能多的建筑空间;2.底层架空将地面空间贡献给城市公共或开放空间;3.机动车与步行系统在不同的层面分离设置;

当我们今天真正面临人口过度膨胀和土地资源的极端稀缺时,“释放底层土地资源于城市,创造更多城市公共空间”的思想,显得极为重要,垂直化更新鼓励将通过底层架空、高度换场地等奖励措施,将更多的场地留给城市大众,创造更多城市绿化空间和自然景观。在《上海市城市更新实施办法》中,进一步明确了鼓励适当提高建筑高度,提供城市公共绿化空间的奖励措施。

## **3. 垂直化更新 – 强调整合交通节点, 打造立体交通枢纽, 无缝衔接, 缓解城市交通拥堵;**



building (Figures 2 & 3). The Institute of Shanghai Architectural Design and Research Co., Ltd., won the bid due to its original design and completed the project with its first-class consulting team.

The Fifth Center project is an important part of the Jinqiao City Renewal Plan. The plot used to be industrial land, with a number of R&D centers, business centers and supporting service functions haphazardly scattered throughout the surrounding area. The Fifth Center project shoulders a critical mission

and challenge of reshaping Jinqiao's urban form, creating a rich urban space, integrating the surrounding industrial structure and establishing Jinqiao as a new innovation hub. It will become a new center and face, showcasing the China (Shanghai) Pilot Free Trade Zone. The Fifth Center project is a key urban renewal project in the Jinqiao district. The design should successfully re-inject vitality to Jinqiao City through the implementation of a host of vertical renewal concepts.

垂直化更新的过程也是一个城市交通资源再梳理的过程，它鼓励将超高层建筑与城市交通节点相结合，形成区域化的交通枢纽，这些高密度的城市枢纽将我们的生活、工作和休闲都将集中在步行距离之内，建筑物将变得更具渗透性，并将首层拆分为多个公共平台，让景观、光线和空气相互渗透贯通。良好规划的公共空间接连在四通八达的交通枢纽上发展的综合体大楼。实现了立体化的交通网络。

#### 4. 垂直化更新 - 强调功能和资源配置的可持续性和前瞻性，为时代变化预留“可能”；

上海不仅在保持传统工业优势面临较大挑战，而且在互联网等新技术和新经济背景下，传统服务经济的发展也面临较大压力，创新经济发展将成为未来城市更新的重点。超高层的建设将不仅要关注生态上的可持续，更应该关注科技创新时代下，新功能和新的工作模式的需求，为新工作模式的出现，预留可持续变化的“可能”，创造多种“适变空间”，以实现建筑的可持续发展。

#### 5. 垂直化更新 - 强调近地空间的多维度连通，疏通城市“毛细血管”，提高城市连通效率；

垂直化更新鼓励建筑是通达多孔的，并将首层拆分成多个公共平台，加强通达性，让人流、景观、光线和空气相互渗透贯通，激活地下楼层，让公共区域得以增强和延伸，以接纳庞大人流的各类活动及休闲娱乐。建筑形体将变得更加灵活多变，从而在各个楼层都可以做到开放、公众化、并富于连接性，促进各个楼层的公共活动和公众生活。



Figure 2. A birds-eye view of the Fifth Center (Source: Enfang Liu)  
图2 第五中心鸟瞰图（来源：刘恩芳）

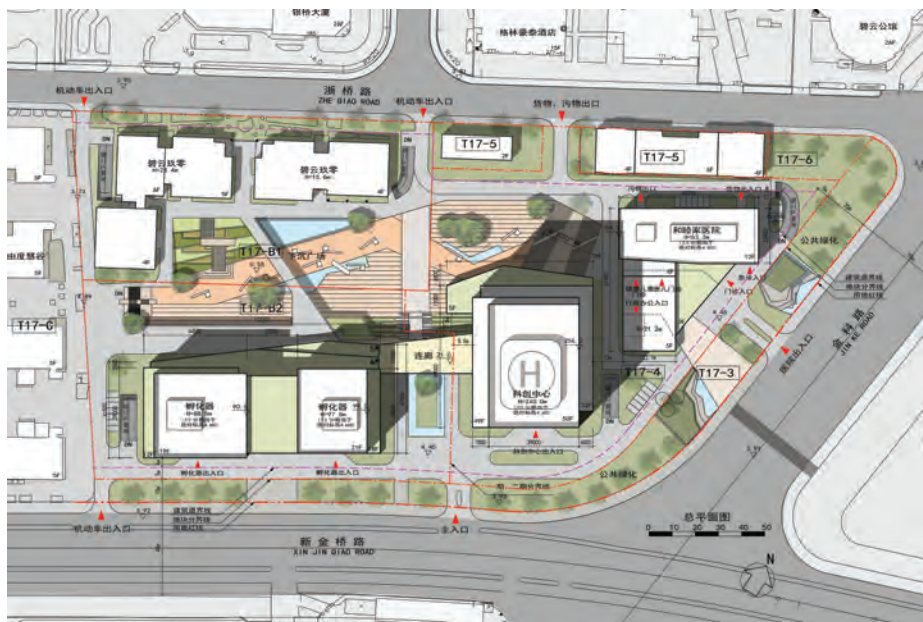


Figure 3. Master plan of the Fifth Center (Source: Enfang Liu)  
图3 第五中心总平面图（来源：刘恩芳）

### 案例研究

#### 案例一—上海自贸试验区（金桥）第五中心项目

项目位于上海浦东新区金桥地区，总建筑面积达34万平米，分两期建设，由一栋260米高度超高层科创中心大楼、两栋100米高度的孵化中心和一栋60米高的和睦家医学研究中心组成（图2、3）。项目由上海建筑设计研究院原创中标，并整合优势顾问团队精心打造。

第五中心项目是上海金桥城市更新计划的重要组成部分，基地早期为工业用地，周边已建有大量研发中心、商务中心及服务配套功能，业态较为复杂、零散。第五中心项目肩负着重塑金桥城市形态、营造丰富城市空间、整合周边产业结构、创造科技金桥的重要使命与挑战，并将成为上海自贸区的新门户和新名片。作为金桥地区的重点城市更新项目，设计通过一些列垂





Figure 4. Ground floor space of the Fifth Center (Source: Enfang Liu)  
图4. 第五中心底层空间 (来源: 刘恩芳)

### 1. Open Ground Floor Space

By elevating the Incubation Center and United Family Medical Research Center, the project attracts people to the public sunken plaza at the center of the plot. At the same time, it reserves more land for the city to use as open public space (Figure 4). The sunken plaza within the plot is fully utilized, and, combined with such elements as the public platform, landscaping, and bridges, a public urban yard is created integrating green space, a recreation area, an interaction area and services. The result is a high quality working environment for the Technology and Innovation Park. This project ornaments the city with an energetic green public park and improves the overall charm of the region.

### 2. Vertical Community

The vertical community concept is introduced in the construction of the tower building, which is divided into five modules at the vertical level. Each module has ten floors, sharing services and supporting resources (Figure 5). Elements including work, recreation, R&D, education and transportation are integrated in the community module, facilitating the sharing of key functional elements and improving the compatibility and complementation between various functions. The Fifth Center is different from traditional working space in that it puts more emphasis on the flexibility of space, relevance and completeness of supporting functions. By combining various functions in a systematic way, it overcomes the limitation of each individual function. Each community thus has its own independent and complete system, which continues to perfect itself together with other systems in the project.

### 3. Diversified and Interactive Communication Platform

Staggered blocks align with the various directions of the landscape which could be observed from the tower. Sight-seeing platforms at multiple levels, interspersed blocks and a comparison between physical and virtual curtain walls make a light and graceful appearance of the building. The internal traffic system enables a better exchange of people and sharing of public functions through the sky lobbies. Each module is a system with complete functions and unique characteristics in its space, which together form an inseparable part of the tower building.



Figure 5. Communication platform of the Fifth Center (Source: Enfang Liu)  
图5. 第五中心交流空间 (来源: 刘恩芳)

直化更新的理念贯彻, 实现对金桥地区城市活力的重塑。

### 1. 开放式的底层空间

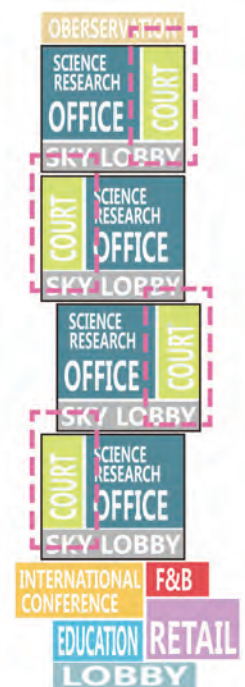
项目通过孵化中心和和睦家医院的底层架空, 将城市人流开放式的吸引到基地中心的公共下沉广场, 同时以开放的心态将更多的场地预留给城市, 提供了更多的公共开放空间 (图4)。充分利用基地内部的下沉广场, 通过公共平台、景观连桥等元素, 打造集生态、休憩、交流、服务于一体的城市公共庭院, 创造高品质的科创园区办公环境。为城市贡献一个具有活力的公共绿化公园, 提升了整个区域的城市风貌。

### 2. 垂直社区

在塔楼的建设中引入垂直社区的概念, 将塔楼在垂直高度上划分为五个模块, 每10层一个社区模块, 共享服务配套资源, 将工作、休闲、科研、教育、交通等要素整合在社区模块中通过垂直方向的叠加, 实现了功能要素的共享、增加了建筑整体功能的兼容性和互补性 (图5)。第五中心有别于传统办公空间, 它更强调空间的灵活性、功能配套的针对性和完整性, 将多种功能系统化的组合在一起, 克服单一功能的局限性, 每个社区具有独立完整的系统, 促使系统向整体最优化的方向发展。

### 3. 多元与互动的交流平台

模块的错动既与塔楼的不同景观朝向相契合, 又创造了不同高度的观景平台, 体块的穿插、幕墙虚实的对比, 更使得建筑外形显得灵动而富有张力; 内部垂直交通体系通过模块间的空中大堂进行人员的转换和公共功能的共享, 每一个模块都是一个功能完整的体系, 都有自





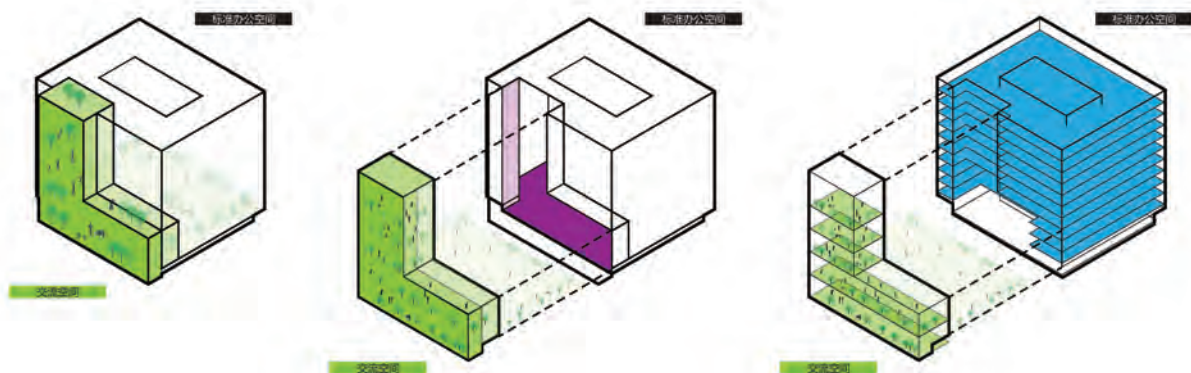


Figure 6. L-Shaped side-opened space of the Fifth Center (Source: Enfang Liu)  
图6. 第五中心L型边厅空间 (来源: 刘恩芳)



Figure 7. Flexible spaces of the Fifth Center (Source: Enfang Liu)  
图7. 第五中心弹性空间 (来源: 刘恩芳)

#### 4. Adaptivity of Reserved Functions

Considering the various functions that may be required in the future and the fact that each user has unique functional requirements, an L-shaped side-opened space is implanted in every standard office of each module (Figure 6). The design takes into consideration the demand for flexible spaces through different communication modes, linkage between upper and lower space and integrated utilization of the space in a confined area (Figure 7). The user can make flexible use of the L-shaped side-opened space based on his or her needs.

#### 5. Perfect Matching between Near-Earth Space and Environment

The design starts with environmental analysis, and the form of the building is decided after a bottom-up investigation of the plot. The staggered levels of the Technology and

Innovation Center reflect the responding relationship between the building and plot. The partially elevated ground increases area for activities, and the variation of widths of the stars on the sunken plaza corresponds with the staggered blocks of the skirt building of the tower, adding a fun flavor while alleviating the sense of pressure of a high-rise building on the ground. Sight-seeing platforms are formed on multiple levels, where the beauty of the city is revealed in full.

#### Case 2 – Vertical City Renewal of the North Bund: Shanghai Industrial Center Project and Shanghai Xinggang International Center Project

The North Bund is situated at the core area of Hongkou District within Shanghai and faces Lujiazui across the Huangpu River (Figure 8). It is near the Tilanqiao Historical Relics Protection Zone and is rich in historical

身独立的空间特色，最终组成了塔楼整体不可或缺的一部分。

#### 4. 预留功能的适变性

考虑未来使用的功能多样性，不同时代，使用者都会有着不同的空间要求，每个模块都在标准办公空间外“植入”了一个L型边庭空间（图6）。设计中考虑了多种交流方式下的弹性空间（图7），局部上下联系，局部上下整体利用，可按使用者需求灵活布置。

#### 5. 近地空间与环境的良好契合

方案设计以环境为切入点，结合场地自下而上的梳理建筑形体。科创中心的体块错落，更好的反映了建筑与场地的呼应关系。底层的局部架空，更增加了场地的活动面积，下沉广场的步行台阶的宽度变化与塔楼裙房部分的体块错动形成良好的呼应和趣味，削弱超高层建筑本身对于地面的压迫感，形体的错动形成了多个层面的观景平台，城市美景尽收眼底。



Figure 8. The North Bund area (Source: Enfang Liu)  
图8. 北外滩区位图 (来源: 刘恩芳)

#### 案例2—北外滩垂直化城市更新：上海实业中心项目及上海星港国际中心项目

北外滩位于上海虹口区核心地段，与陆家嘴隔江相望。临近提篮桥历史风貌保护区，具有深厚的历史文化底蕴。此区域多个项目在城市设计阶段本着城市更新的原则，整体设计、协同开发。该区域汇聚了多栋超高层综合体，是虹口区垂直化城市更新的重点区域（图8）。上海设计研究院近十年间，在这一片区参与了其中80%以上的单体设计和总体设计协调工作。继星港国际中心项目之后，携手森大厦及美国NBBJ建筑设计公司打造北外滩文化新地标——上海实业中心项目。



and cultural heritage. This region has a number of projects that follow the integrated design and synchronized development principle guided by the urban renewal concept. Boasting several super high-rise building complexes, it is a key region for vertical urban renewal in Hongkou District. During the last 10 years or so, the Institute of Shanghai Architectural Design and Research has participated in the design of over 80% of individual buildings in the area, taking charge of the overall design coordination work. Following the Xinggang International Center project, it will join hands with the Mori Building Company and NBBJ, a famous U.S. architecture design firm, to build a new cultural landmark on the North Bund – Shanghai Industrial Center Project.

The Shanghai Industrial Center Project has a total land area of 23,000 square meters and a floor area of 220,000 square meters. Its main structures include a 180-meter tower, a super-large musical theater with 2,000 seats and themed commercial areas (Figures 9 & 10). The project features integrated design, compatible and complementary functions, fully connected traffic systems and undivided development of the roof garden, focusing on the social features of urban renewal.

### 1. Continuity and Multiple Dimensions

The underground space is connected to the wharf on Gongping Road, the underground second level with the metro station, corridor on the second floor with the surrounding project and roof garden with the highline. Connections at multiple levels build



Figure 9. Mutil-level continuity of Shanghai Industrial Center (Source: Enfang Liu)  
图9. 上海实业中心立体连接 (来源: 刘恩芳)

上海实业中心项目总用地面积约2.3万平方米，总建筑面积为22万平方米，主要由一栋约180米高塔楼、拥有2000座位的特大型音乐剧剧院以及主题商业组成（图9、10）。项目秉承片区一体化设计，功能兼容互补，交通体系互联互通，屋顶花园整体开发，强调了城市更新的社会属性。

#### 1. 连续性与多维性

地下空间与公平路码头连接、地下二层与两座地铁站连接、二层空中连廊与周边项目连接、屋顶花园highline连接。通过多层次连接打造了区域内的连续性，为行人提供了清晰合理的多维度流线系统。

#### 2. 与星港国际中心形成城市交通枢纽

连接地铁12号线及19号线、公平路客运码头及星港国际中心下部的公交枢纽中心，打造集地铁、航运、公交、空中步行系统于一体的城市交通枢纽节点。

#### 3. 创造活力公共空间

通过文化功能的植入，将城市公共生活引导至二层空中平台及屋面绿化公园。并结合绿廊、特色商业中心以及剧院构成的底层空间打造一个充满活力和人文气息的街区。



Figure 10. Integrated connection of Shanghai Industrial Center (Source: Enfang Liu)  
图10. 上海实业中心一体化连通 (来源: 刘恩芳)

continuity within the area and provide a clear and reasonable three-dimensional flow system for pedestrians.

## 2. Forming an urban traffic hub together with the Xinggang International Center

Line 12, Line 19, the ferry terminal on Gongping Road and the bus transportation hub connect beneath the Xinggang International Center and build an urban transportation node integrating metro, shipping, bus transportation and the sky-bridge system.

## 3. Creating an energetic public space

This serves to guide urban public life to the aerial platform on the second floor and roof garden by implanting cultural functions, with a booming street block full of cultural atmosphere built on the underground level complete with a green corridor, special commercial center and theater.

## Summary and Outlook

Shanghai, a megacity, is developing toward a high-density and vertical city. Vertical renewal, as an effective means for the renewal of megacities, is exerting far-reaching impact on the urbanization of Shanghai. We hope that vertical urban renewal can play a critical role in integrating super high-rise buildings into the city, contributing to the improvement of the quality of life in the community and city and effectively resolving various urban problems. This paper has attempted to explore various design strategies for building a sustainable, high-density, vertical and livable megacity, which has meaningful implications for the future development of megacities.

## 总结与展望

上海这座巨型城市正朝着高密度化、垂直化快速发展，垂直化更新作为一种有效的巨型城市更新手段，正在广泛的影响着上海城市发展进程。我们希望通过垂直化的城市更新使超高层建筑能融入城市、贡献社区、提升城市的生活品质，并有效的解决城市问题。本文力图探索一系列可持续性、高密度、垂直化、宜居化的巨型城市设计策略，以此展望巨型城市发展的广阔未来前景。

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