Build Community Resilience Beyond Covid-19

—— Towards a liveable and smart future

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It has always been my pleasure to live and work with all of you. I am looking forward to seeing what the future looks like.

June, 12, 2022

Cover image: The vision of a liveable and smart future
Source: Author

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01 INTRODUCTION

Residents lined up for group purchases during the Wuhan community closing management period.
Source: https://kknews.cc/society/yj8bvvn.html

1 Introduction

A new coronavirus outbreak ripped across the world in early 2020. The city of Wuhan, the worst area of the early outbreak, suffered a huge blow. Based on the way the virus spread, Wuhan took unprecedented emergency actions to contain the outbreak. The community was considered the first line of defense and the backbone of the outbreak control (The State Council Information Office of the People's Republic of China, 2020). Closed community management played a critical role in Wuhan's success in controlling the spread of the virus.

However, pandemic prevention and control have revealed problems in community governance, space, and human capital, which have seriously affected the community's ability to respond to the pandemic, and even caused secondary harm to the health and well-being of residents and increased social segregation. In addition, new infectious disease threats may re-emerge in the future, and communities will continue to suffer great impact. In response to the above problems, community resilience, a hot topic in disaster prevention and mitigation, can be used to explore solutions.

In addition to the actual situation of problematic community capacity, there are many knowledge gaps in domestic research on community resilience. For example, most domestic studies explore natural disasters (earthquakes, fires, etc.), there is less research on community resilience from the perspective of pandemics, and there is less exploration of governance and human capital. Another example is that most studies focus on proposing strategies and lack specific community practices in local contexts.

Therefore, it is urgent and valuable to explore community resilience in the context of the Wuhan pandemic perspective.

This project seeks to establish an integrated strategic framework to improve community resilience and achieve a liveable and smart urban environment in Wuhan in the long term, and to achieve the SDG goals of good health and well-being and sustainable cities and communities.

Keywords: Community resilience; Covid-19; Spatial planning; Governance; Urban renewal; Digital transition

Fig.1.1.1 Community workers helped residents buy and deliver medicine to their homes.
Source: https://kknews.cc/society/yj8bvvn.html

2 Motivation

This project comes from my personal experience. As a native of Wuhan, I have experienced the worst of the pandemic, the lockdown of the city and the closure of all communities, and the gradual unsealing of the whole process. As one of the hardest-hit areas in the early stages of the COVID-19, I was impressed by the various natural and man-made disasters that occurred during this period, as well as the strong top-down governmental enforcement measures and the bottom-up initiatives, organized voluntarily by the united residents.

Although Wuhan was ultimately successful in containing the spread of the pandemic, I am saddened by the tremendous social, economic, and human losses caused by the delayed early response. Not only were people's lives and health threatened, but the normal daily lives of citizens in the community were disrupted. On top of that, the disease exacerbated pre-existing social inequalities. With better management, much of the secondary harm could have been avoided and the society could have recovered more smoothly and quickly.

The infectious disease has profoundly affected society, economy, community life, and many other aspects, and brings challenges and opportunities for future development. How to deal with the new crown and the possibility of similar infectious diseases in the future needs to be urgently addressed. There is also a need to think about how to use development trends such as digital technology to achieve better governance, etc. Naturally, I am interested in how to cope with the pandemic at the community level which is regarded as the basic urban dwelling unit, and I am also concerned about the changes in people's lifestyles influenced by the pandemic. I chose the popular theme of Community Resilience to help me study the corresponding area.

Thus, I hope that my project can inspire better construction in my hometown by exploring community response during the Wuhan pandemic and existing theoretical and practical research, trying to find out more applicable community resilience assessment and building strategies under the pandemic.

Fig.1.2.1 Community staff guarded the community gates.
Source: https://baijiahao.baidu.com/s?id=1658345449213902252&wfr=spider&for=pc

02 CONTEXT

1 Pandemic and community worldwide
2 Pandemic impacts on China
3 Community resilience in China
4 Metropolitan Wuhan
5 General community response

At night, community security officers with trumpets shouted to residents to be safe and aware of the virus.
Source: http://ex.chinadaily.com.cn/exchange/partners/80/rss/channel/cn/columns/o87wjf/stories/WS5e30ffc4a3107bb6b579c135.html

1 Pandemic and community worldwide

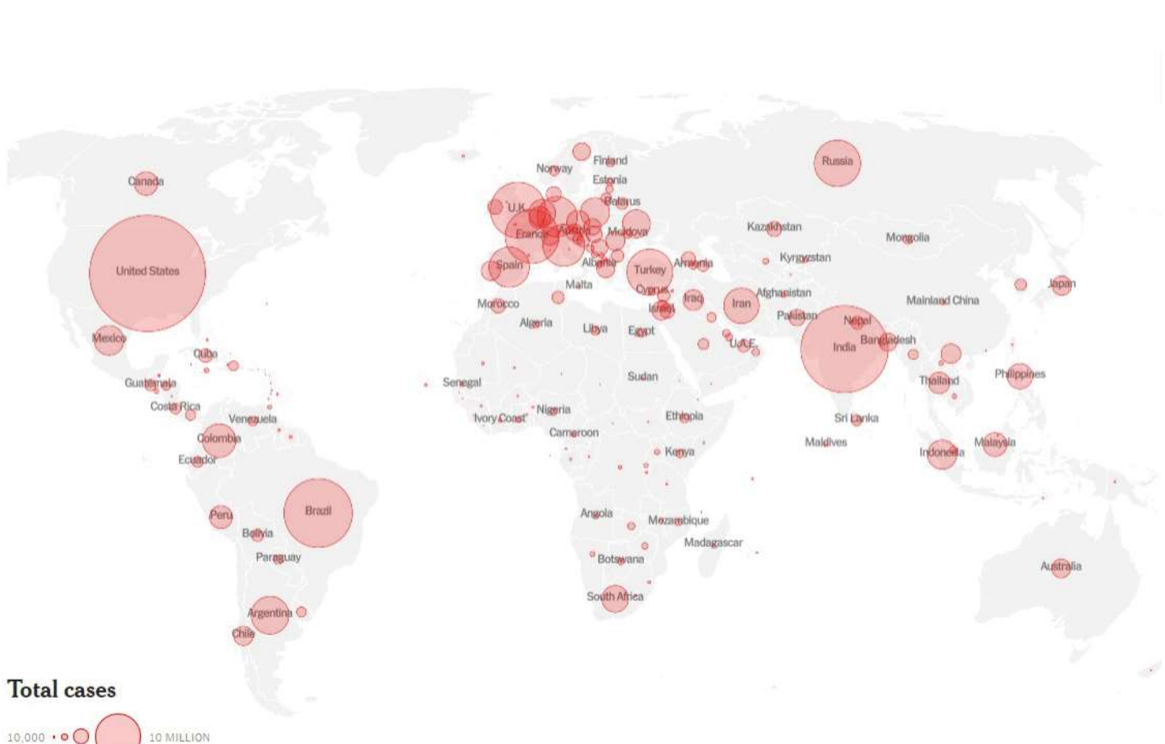


Fig.2.1.1 Total death cases globally
Source: https://www.nytimes.com/interactive/2021/world/covid-cases.html

1.1 Severe impact of pandemic

Coronaviruses have affected the human world 3 times in the last two decades (SARS, MERS, COVID-19). Among those, the COVID-19 virus has posed the biggest threat to public health to all humans in early 2020.

Current evidence suggests that the virus is mainly transmitted between people who are in close contact with each other, for example at talking distance; the virus can also be transmissible in badly ventilated and/or congested indoor environments; people can also become infected after touching surfaces or objects contaminated with the virus. (WHO, 2021b). Thus, the current effective protective measures recommended by the WHO include maintaining social distance, proper wearing of masks, frequent hand washing, etc (WHO, 2021a). Many countries have also taken corresponding restrictive measures. However, these measures are nowhere near enough to alleviate the speed of the pandemic outbreak.

So far, waves of variants thrive, uncontrolled in many regions. According to the dashboard of WHO, the current toll in total is over 280 million infected cases, 5 million deaths as of this writing (WHO, 2021). What's more, the impact of this global disaster has transcended the scope of public health. It has interfered negatively with nearly every aspect, from human life to society, economy, international political relations (Fenxia, 2022).

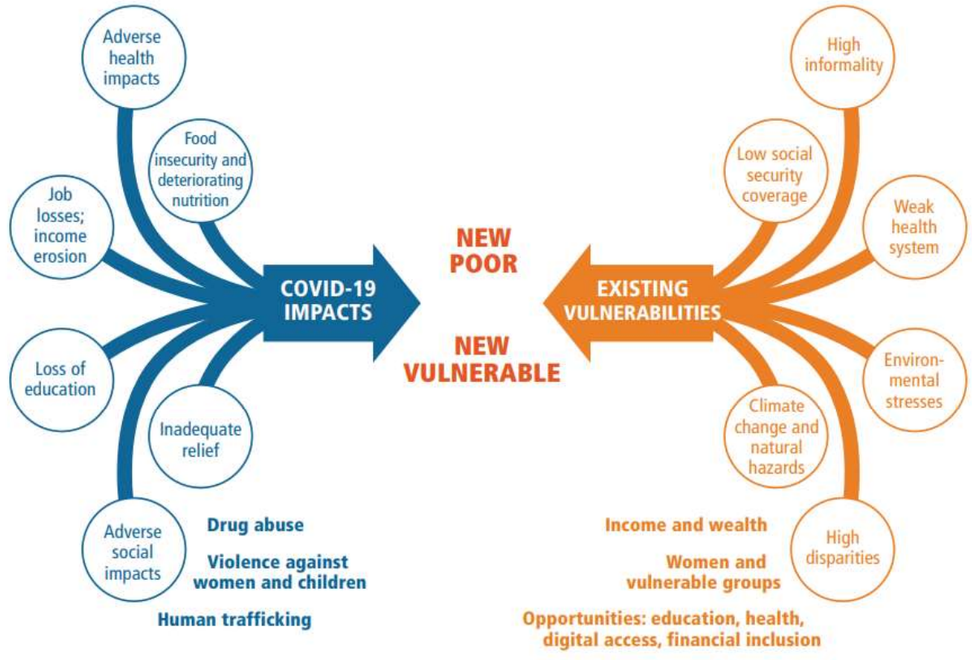
While the trend of globalization and rapid urban growth is unstoppable, cities have become the hotspots for the spread of the virus. Larger cities suffered a higher preliminary infected rate because of city scale, population, and connectivity (UN-Habitat, 2021).

1.2 Community in action

Against this background, as the basic unit of the urban system, the importance of community is internationally recognized. Evidence from the UK displayed the critical role of community and community-based organizations in the recovery process after the outbreak of COVID-19 (South et al., 2020). Experience in combating COVID-19 from Singapore show efficient and sufficient health care and surveillance systems alone are not enough to contain a pandemic; community efforts are essential (Yip et al., 2021). Likewise, community actions in the Netherlands exhibited their significance both in meeting urgent needs and in providing future support (den Broeder et al., 2021).

Thus, with the frequent occurrence of infectious diseases in cities, it is urgent to reduce their threat to people's lives and their subsequent societal harm. The community will be one of the key points.

Fig.2.1.2
Source: https://www.nytimes.com/interactive/2021/world/covid-cases.html



Source: Adapted from Titumir, Rashed Al Mahmud (2020). Which recovery path may we pursue? New Age, 15 October. Available from www.newagebd.net/article/118990/which-recovery-path-may-we-pursue.

Fig.2.1.3 COVID-19 Exacerbates pre-existing vulnerabilities
Source: Responding to the COVID-19 Pandemic: Leaving No Country Behind (ESCAP et al., 2021)

2 Pandemic impacts on China

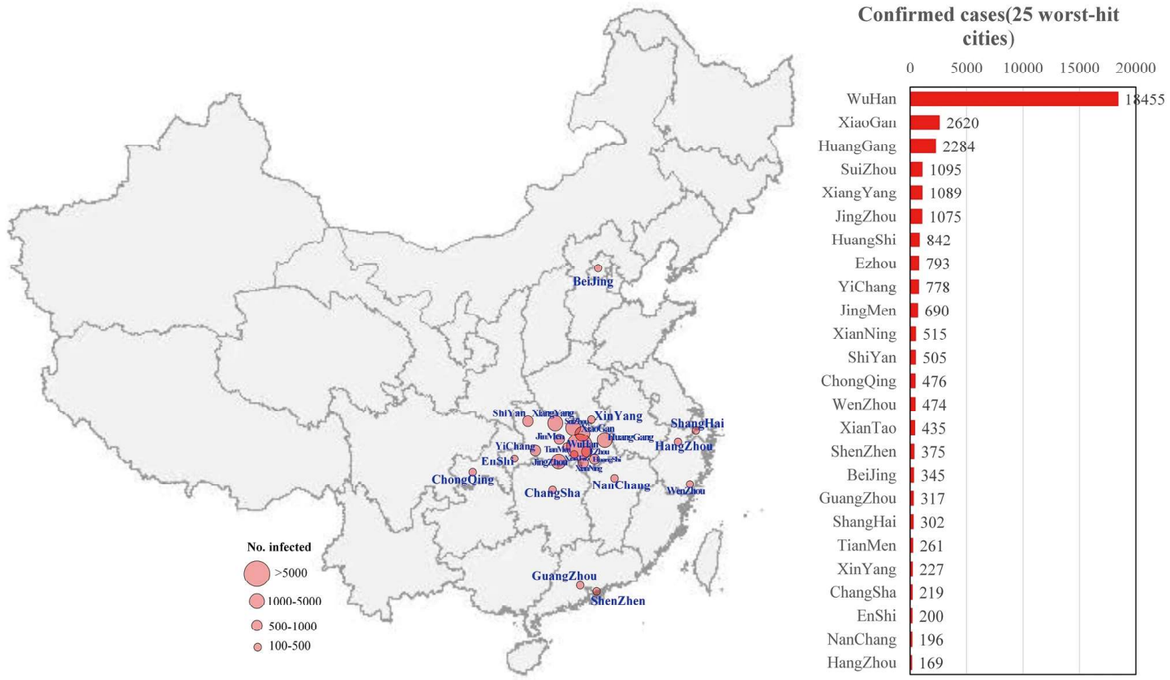


Fig.2.2.1 A geographic information map of the cumulative number of confirmed COVID-19 cases as of February 10, 2020 in the 25 worst-hit Chinese cities
Source: https://www.nature.com/articles/s41598-020-79063-x

2.1 Cities and gated communities

On December 31, 2019, confirmed cases of novel coronavirus disease 2019 (COVID-19) were reported in Wuhan, China, and cases have also been confirmed in other Chinese cities. Because there are many internal zones with closely related economic, social, and commuting relationships and high population densities, large cities are most vulnerable to pandemic outbreaks (UN-Habitat, 2021). This map also shows that excluding Wuhan and surrounding cities, most of the most affected cities in China are provincial capitals.

Due to the mode of transmission of the new coronavirus, the government has increased restrictions and screening of population movements and has imposed or encouraged social isolation. The community, as the smallest spatially based urban governance unit, has become an important link in pandemic prevention and control (UN-Habitat China et al., 2020). Gated communities whose prevalence is often linked to China's unique tradition of gated living played a vital role in COVID-19 control and prevention.

2.2 Digital technology

Digital technology has played a significant part in China's fight against the pandemic, becoming an indispensable and powerful tool for governments, health systems, businesses, and the public (The Rockefeller Foundation, 2020). Digital platforms are essential to the implementation of government prevention and control strategies, such as policy issuance, risk monitoring, population tracking, community management, etc. The public's normal life is also closely connected with digital technology, such as online shopping for daily necessities, home office learning, remote access to medical care, information access and dissemination, etc.

Fig.2.2.2 COVID-19 activity map search result sample
Source: Tackling Covid-19 Pandemic through Integrating Digital Technology and Public Health(The Rockefeller Foundation, 2020)

Fig.2.2.3 Staff controlled community access.
Source: https://baijiahao.baidu.com/s?id=1658345449213902252&wfr=spider&for=pc

Category	Sub-category/Case studies	
Fast Response		Digital China Health
Epidemiological Studies		No Case Selected
Diagnose and Treatment		United Imaging
		WeDoctor
		Zuo Shou Yi Sheng
Supportive Activities	Information Communication	DXY
	Public Health Training	
	Population Flow and Density	Baidu Map
	Medical Related Information	Tencent
	Social Support	
	Logistics	Beijing Viewhigh Technology
	Support for Elderly	IZhaohu
Long-term Management	Resumption Management	Mininglamp Technology
	Community Management	JD Digits
Comprehensive Disease Control System		Alibaba

Fig.2.2.4 Representative case studies of digital technology applying in COVID-19
Source: Tackling Covid-19 Pandemic through Integrating Digital Technology and Public Health(The Rockefeller Foundation, 2020)

2.3 Urban renewal and community building

China has grown rapidly in recent years. As of the end of 2019, China's urbanization rate exceeded 60% for the first time, with an urban population of 848.4 million (HU & HU, 2021). As can be seen from the figure, 65% of the population will be living in urban areas by 2050.

With the urbanization process entering the middle and late stages in general, China's cities will enter the era of stock development, i.e., urban renewal, focusing on the quality transformation of limited space (X. WANG, 2021). The national 14th Five-Year Plan proposes to "implement urban renewal actions" and "strengthen the renovation of old urban areas and community construction"; at the national strategic level, the plan puts forward higher requirements for sustainable community planning and renewal implementation (Urban Planning Society Of China, 2021).

In the context of urban renewal and community building, uncertain outbreaks of infectious diseases and the rapid development of digital technology have led to changes in people's daily work behaviors and lifestyles. To improve people's health and well-being, urban and community spaces should be developed accordingly.

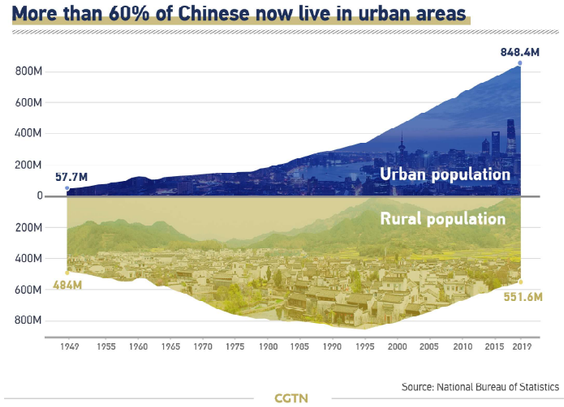


Fig.2.2.5 Urban and rural population ratio in China
Source: https://news.cgtn.com/news/2021-03-25/Graphics-China-to-see-10-million-more-urban-residents-per-year-YTsMIKKY6c/index.html

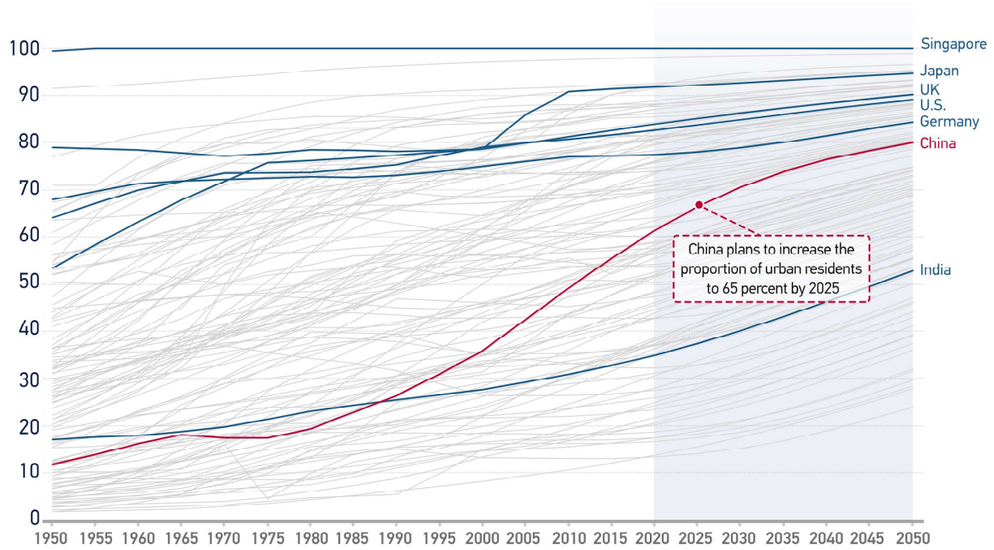


Fig.2.2.6 Trend of urbanization rate of China comparing to other countries
Source: https://news.cgtn.com/news/2021-03-25/Graphics-China-to-see-10-million-more-urban-residents-per-year-YTsMIKKY6c/index.html

3 Community resilience in China

3.1 Theory and practice

Resilience comes from the Latin word "resilio". It means spring back or rebound in English(Resilio - Wiktionary, n.d.). Since the 1960s, the mainstream view has been characterized by the evolution of resilience as engineering resilience, ecological resilience, social resilience, evolutionary resilience, etc. (Folke, 2006). In the 1990s, research shifted to a new focus on "community resilience" (JIANG et al., 2021).

Most scholars assign three meanings to community resilience, which can be a collection of capabilities, a process of community capacity enhancement and disaster adaptation, and as a goal of community development (Peng et al., 2017).

Compared to foreign countries, resilience research in China started relatively late. Regional and urban scale resilience research attracted attention first, and community resilience is a typical application of resilience in inner-city space, whose research has only emerged in recent years (Peng et al., 2017). In terms of theory, domestic scholars' research mainly focuses on community disaster prevention and mitigation, connotation analysis of community safety resilience, and mechanisms of community public safety resilience construction model (JIANG et al., 2021).

A mature theoretical framework has also not been formed for the division of community resilience dimensions in China (CUI et al., 2018), although the dimensions of community resilience have gradually expanded from a smaller range of fragmented indicators to comprehensive and unified indicators with a wide variety. Most of the scholars take universal non-specific types of communities as the object of study, and rarely consider the context under specific locations.

Futhermore, the study (TIAN, 2020) provides an overview of the practice of resilient communities in China, indicating that the study of community resilience in China is gradually shifting from the traditional passive "disaster prevention" perspective to a proactive "disaster adaptation" perspective of resilience.

In conclusion, theoretical research and practice on community resilience in China are still in their elementary stage. In terms of the research scope, disaster prevention and mitigation in natural and accidental disaster scenarios under the concept of resilience still dominates; in terms of strategy implementation, there are relatively few corresponding practices.

3.2 Policy guidance

In recent years, "resilience" has become a high-frequency word in China's urban and community governance. 2018 saw the establishment of the Urban and Rural Resilience and Disaster Prevention and Mitigation Professional Committee of the China Disaster Prevention Association, which simultaneously launched a draft on the theme of "promoting the construction of seismically resilient cities and rural areas and improving natural disaster prevention and control capabilities". 2020 marked the beginning of the construction of "resilient cities" in the central government's 14th Five-Year Plan and Vision 2035. "Resilient City" was included in the Central Government's "14th Five-Year Plan" and "2035 Visionary Goals". The Resilient City Research Center of Zhejiang University, n.d., was held in Shanghai in June 2021.

In November of the same year, Beijing issued the "Guidance on Accelerating the Construction of Resilient Cities" to build 50 resilient communities or resilient neighborhoods by 2025 (WANG, 2021).

In addition, in the 14th Five-Year Plan, improving the ability to respond to public health emergencies has become an important strategy to comprehensively promote the construction of a healthy China (SUN, 2020).

It is evident that enhancing "resilience" and safeguarding urban health and safety are core priorities for future urban planning and governance, while community-scale governance is increasingly emphasized.

Fig.2.3.1 Building "Safe and Resilient Cities" 2021 Summit
Source: https://www.163.com/dy/article/GDDOUJ9N0512DU6N.html

4 Metropolitan Wuhan

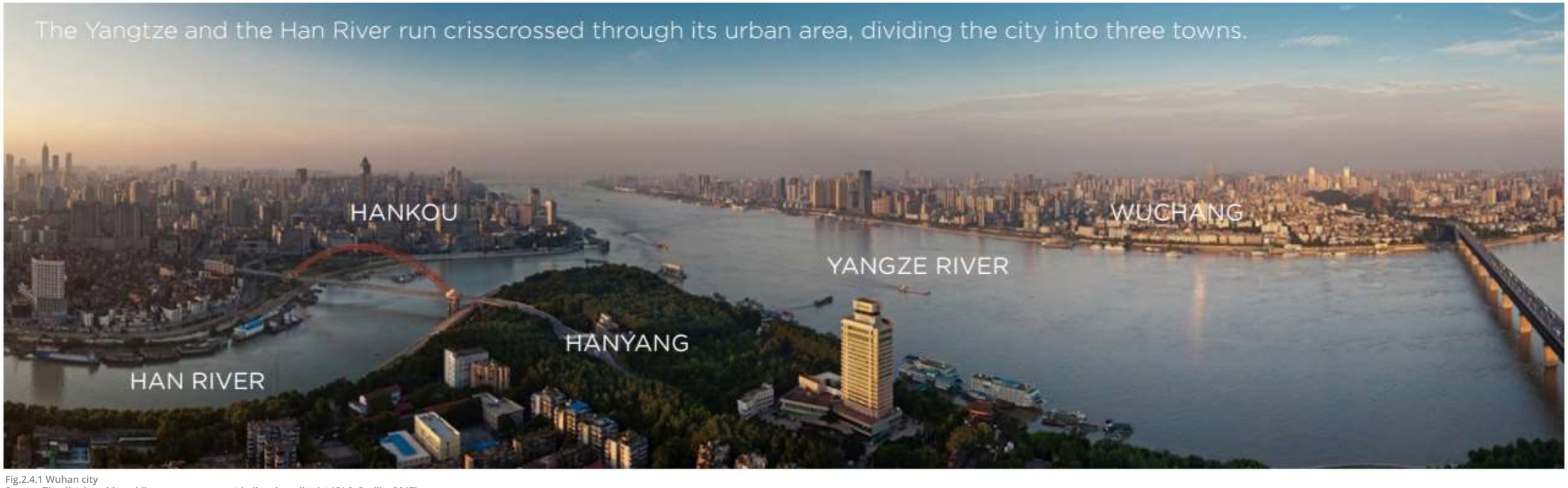


Fig.2.4.1 Wuhan city
Source: The district-wide public space assessment in Jianghan district (QI & Cecilia, 2017)

4.1 Basic information: Population, Economy, Transportation

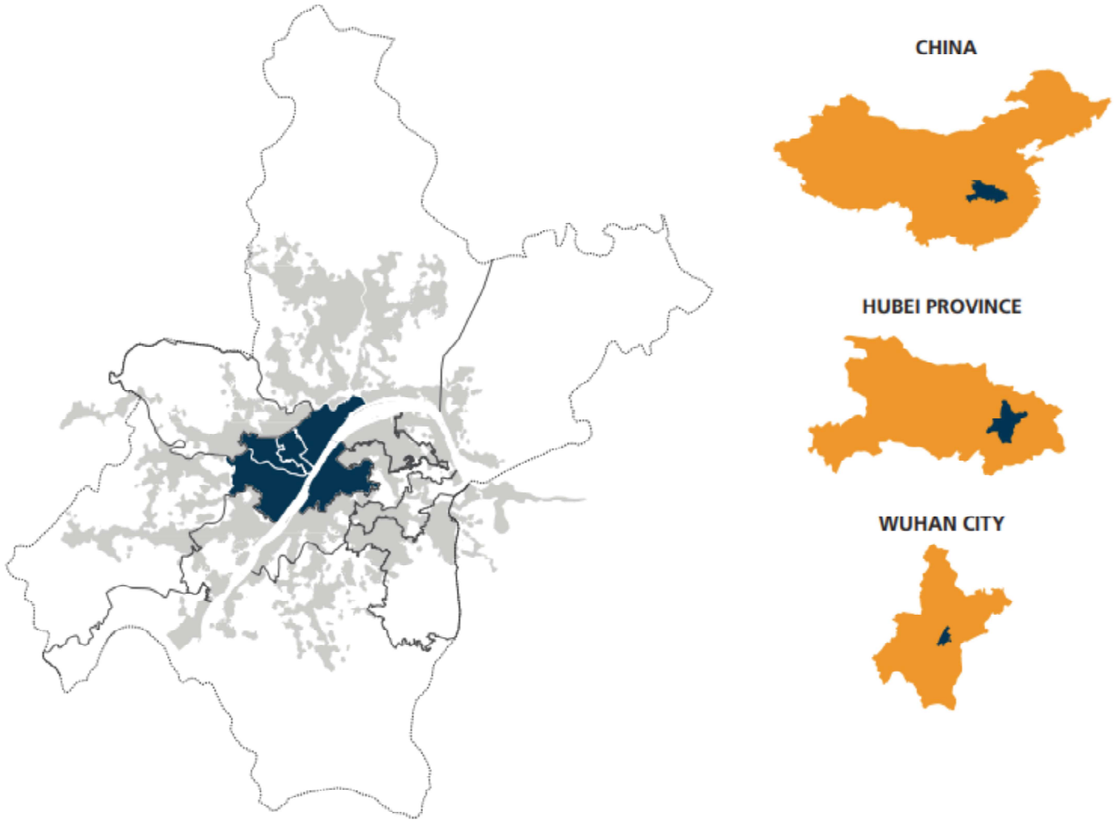


Fig.2.4.2 Location
Source: Assessment of Public Spaces in a Heritage District, Wuchang, Wuhan, China (LIANG, 2018)

Regarded as the capital city of its province, Wuhan is the most populated and biggest city in Hubei province in central China. It is composed of seven urban areas and six suburban and rural areas. Its resident city is anticipated to reach 11.2 million people by 2030 (QI & Cecilia, 2017).

Wuhan's economy ranks as the 8th largest city economy in China, valued at nearly 1.5 trillion yuan in 2018, while it is growing as a regional center for trade, politics, industry, and education (daxueconsulting, 2020).

Wuhan has a unique regional transportation advantage in the country, thanks to its geographical location in the center of densely populated central-eastern China. Wuhan has historically been a node to nine provinces in the middle of China, and it is a hub at the intersection of rail, road, and waterways (QI & Cecilia, 2017).

In addition to high regional connectivity, the development of the Wuhan Metro has greatly facilitated the movement of people within the city. Opened in 2004, the metro network has been hailed as one of the most successful in China due to its rapid expansion, and now features nine lines and 340 km of track (daxueconsulting, 2020).

Fig.2.4.3 Basic information
Source: The district-wide public space assessment in Jianghan district (QI & Cecilia, 2017)

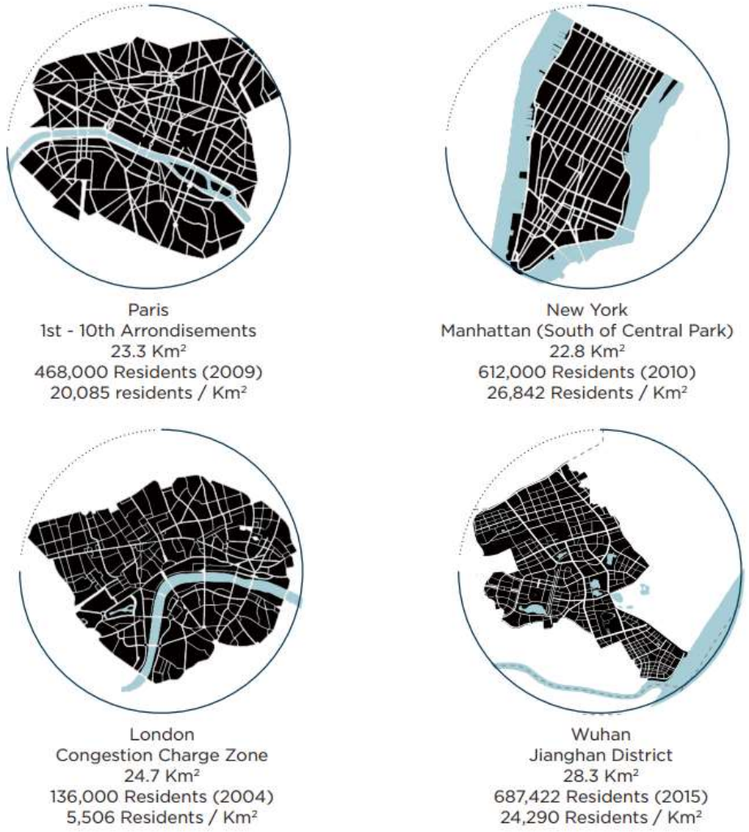


Fig.2.4.4 Jianghang District as one of the most densely populated districts in Wuhan comparing to other cities
Source: The district-wide public space assessment in Jianghan district (QI & Cecilia, 2017)

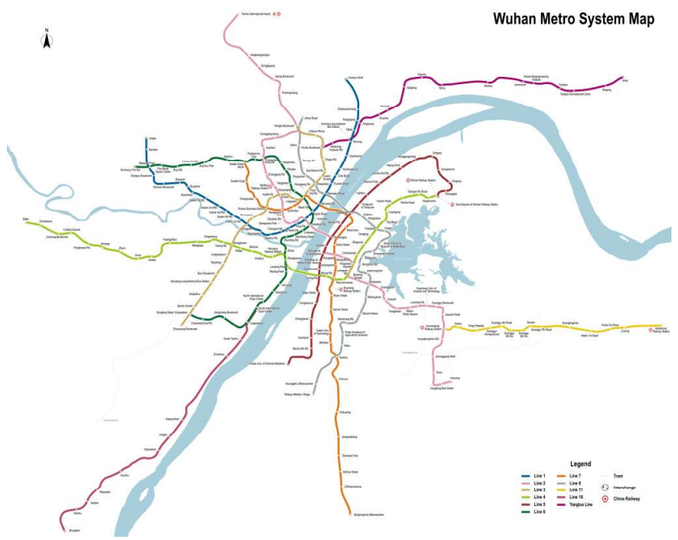


Fig.2.4.5 Wuhan metro system
Source: https://www.wikiwand.com/en/Wuhan_Metro

4.2 Community governance and plan

Wuhan city, as a rapidly developing metropolis, has a large variety of communities. Almost all modern commercial residential communities are set up with access control. Older communities have some gated but unmanaged access or some do not have gates and can be seen as open communities.

The governance of communities adheres to a multi-tiered hierarchy. Administrative functions are mainly assumed by the Wuhan municipal government, district governments, and street offices in turn. The neighborhood committee is a grassroots organization that assists the street office government with certain administrative functions, and its jurisdiction covers several communities. At the smallest scale, not every community has a property management company or owners' committee because of the existence of open communities.

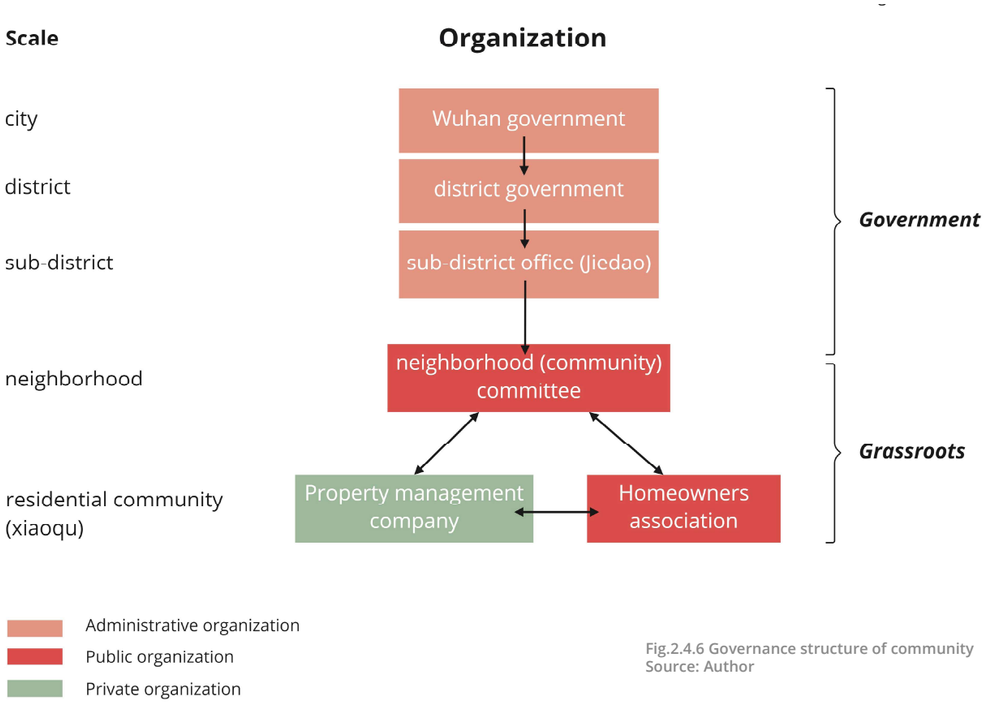


Fig.2.4.6 Governance structure of community
Source: Author

Fig.2.4.7 The gate and iron fences of a modern residential community
Source: https://wuhan.newhouse.fang.com/loupan/2611193388/photo/list_903.htm

Fig.2.4.8 The walls of a residential community
Source: https://wh.lianjia.com/xiaoqu/3713305859550904/

Fig.2.4.9 the administrative scope of Wuhan Baisong neighborhood community
Source: Author, based on AMAP

4.3 COVID-19 and policies responding to it

A new coronavirus outbreak swept through Wuhan in early 2020. The city was hit hard by a surge of early infections in Wuhan. Infections were most severe in the central city.

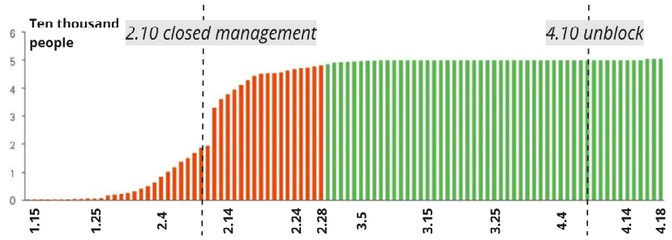


Fig.2.4.10 Statistics on the cumulative number of Covid-19 confirmed cases
Source: https://weixin.caupdcloud.com/?p=708014

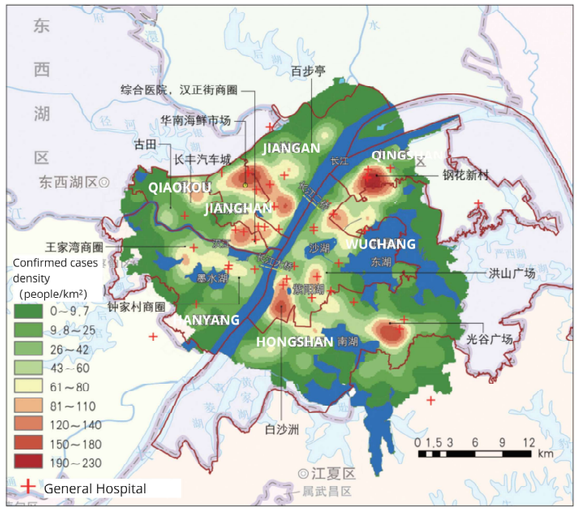


Fig.2.4.11 Heat distribution map of Wuhan pandemic till 2020.2.28
Source: https://weixin.caupdcloud.com/?p=708014

Fig.2.4.12 No people or cars in the city center business district during the city lockdown
Source: http://www.xixik.com/content/7fe44437c6e0a69f

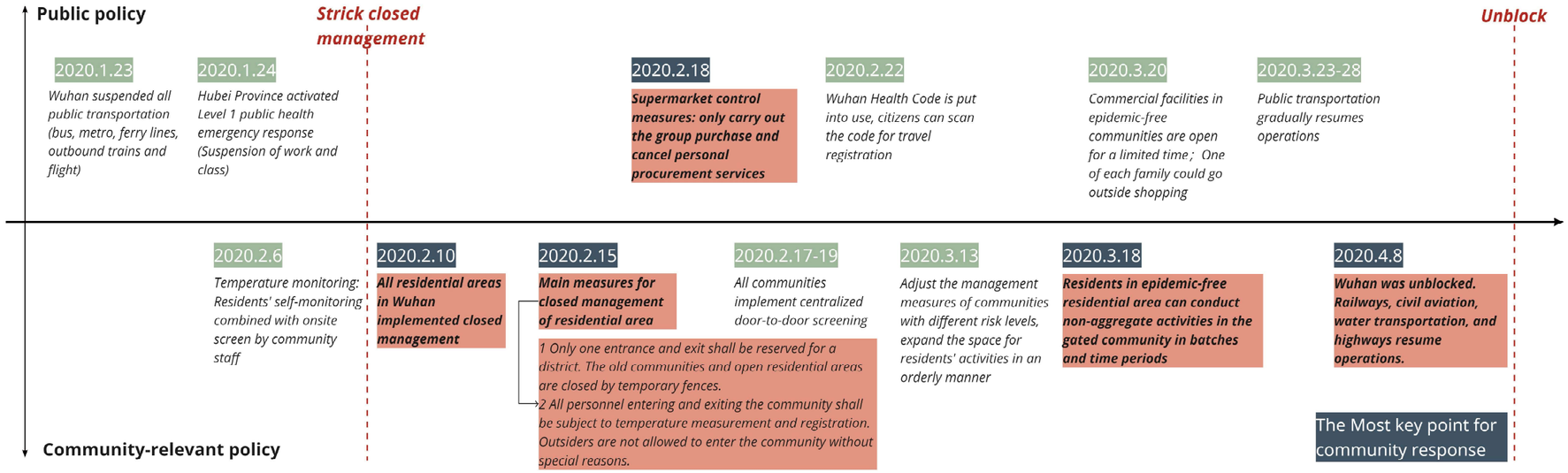


Fig.2.4.13 Public policies timeline
Source: Author

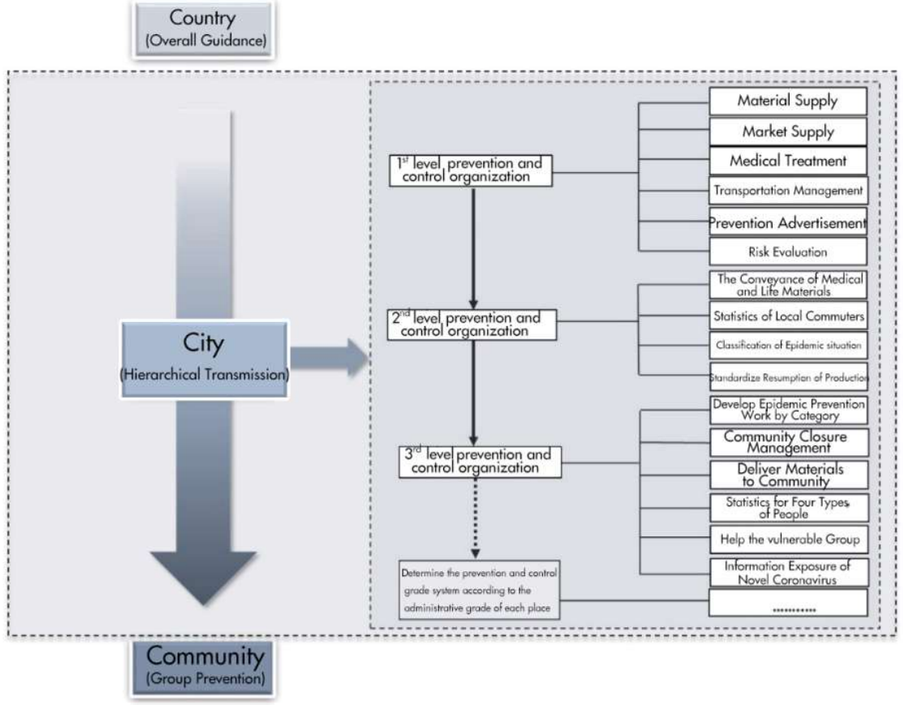


Fig.2.4.14 Schematic diagram of urban hierarchical conduction organization system
Source: COVID-19 Wuhan Guidance Papers-Emerging Experiences on Responding to COVID-19 in Chinese Cities and Townships (UN-Habitat China et al., 2020)

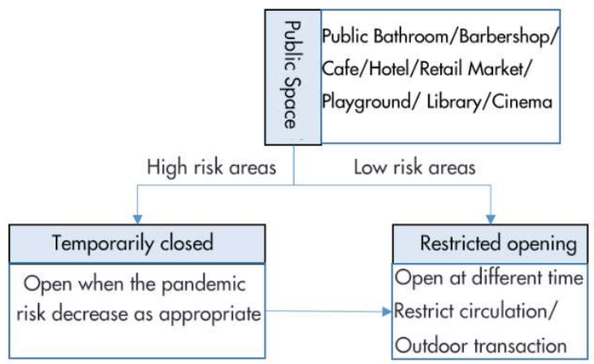


Fig.2.4.15 Schematic diagram of control in public places
Source: COVID-19 Wuhan Guidance Papers-Emerging Experiences on Responding to COVID-19 in Chinese Cities and Townships (UN-Habitat China et al., 2020)

According to a series of policies above, we can see Wuhan has taken unprecedented and urgent actions to contain the pandemic, from city level to community level. In addition to medical treatment, preventive and control measures are pivotal in reducing the spread of the virus.

At the city scale, the government has set up a hierarchy of pandemic prevention and control agencies in the city as a system, combined with the local administrative hierarchy, to clarify and guide the priorities of epidemic prevention and control within the administrative jurisdiction, and to maintain information sharing between the various levels of prevention and control command agencies (UN-Habitat China et al., 2020). Prevention and control extend to the smallest scale, which is the community.

Community is regarded as a mainstay in Wuhan's COVID-19 response because it is the first defense of pandemic prevention and control. The government has implemented strict access control and grid-based management in the community, with human and material resources decentralized to the community level to strengthen the implementation of targeted measures (The State Council Information Office of the People's Republic of China, 2020).

5 General community response

According to the diagram (UN-Habitat China et al., 2020), general community responses in Wuhan are mainly divided into community closure management, material distribution, and screening of pandemics.

The keyword search through the big data platform shows that community closure, living materials, grocery shopping, and lack of chronic medication are high-frequency words of public concern (LI, 2020). This also indicates that the most critical aspects for both residents and community staff are community closure management and material distribution, as it affects the normal needs of residents.

Closed community management refers to a relatively independent and densely populated space such as the community as the basic unit for closed management, to reduce unnecessary out-of-home activities (UN-Habitat China et al., 2020). The main measures of closed community management are: 1. entrance and exit control, each community only retains 1-2 entrances and exits, which are guarded around the clock, and residents are required to register and take body temperature when going out or entering; 2. information transmission and exchange, the community and residents exchange the latest pandemic news and life service information on time; 3. community disinfection, the staff conducts high-frequency disinfection of community public areas daily.

Material distribution refers to the mode of supplying living materials, which is coordinated by relevant institutions, centrally procured, or helped to contact by the community, and home delivery by volunteers, with the main characteristics of designated sites and delivery (UN-Habitat China et al., 2020). Among them, community procurement accounted for most cases, there are also residents to organize their online group purchases.

Fig.2.5.1 Inadequate circulation of household goods exacerbates the risk of mobility of residents
Source: https://mp.weixin.qq.com/s/rr6_DJVOZIDOV0_e7rhA8g

5.1 Neighborhood grid method and core tasks

The neighborhoods are divided into a number of neighborhood grids according to the actual situation, and the neighborhood grid manager coordinates the community prevention tasks and mobilizes civil society organizations to cooperate (UN-Habitat China et al., 2020).

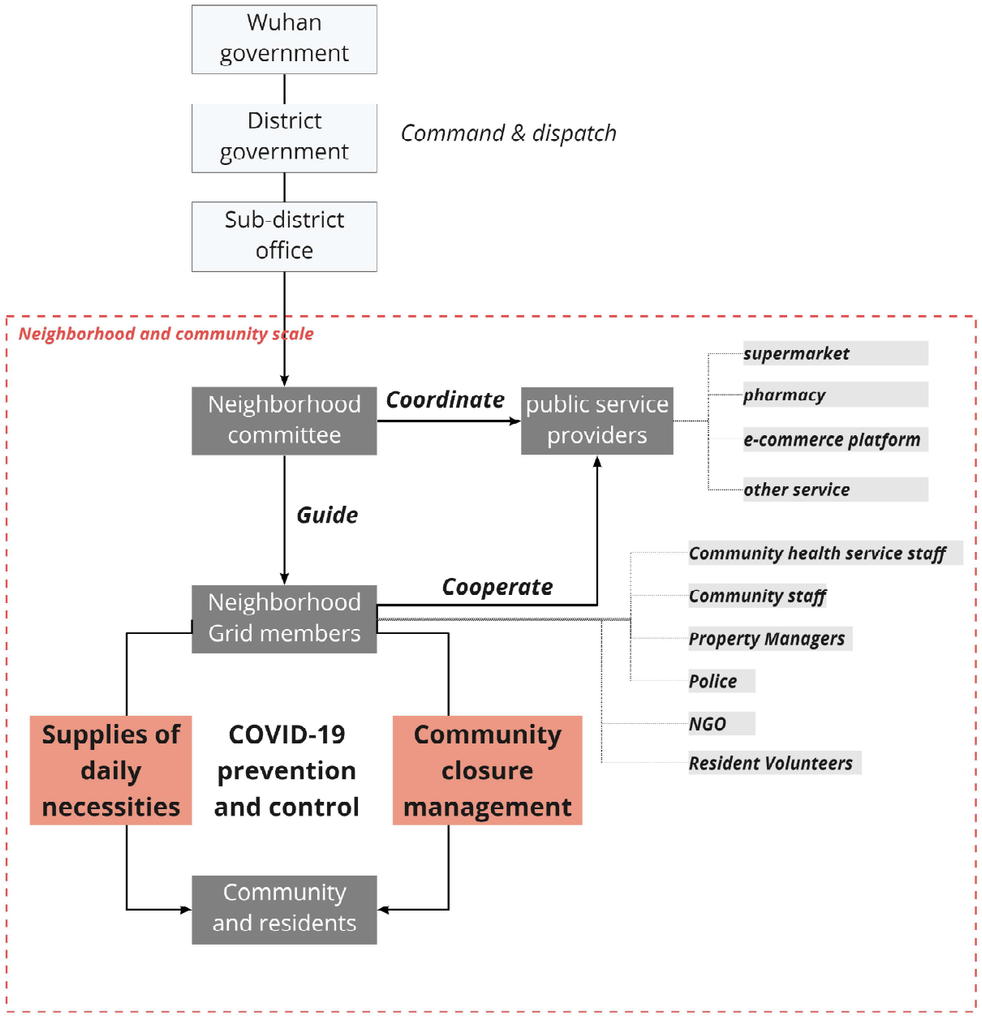
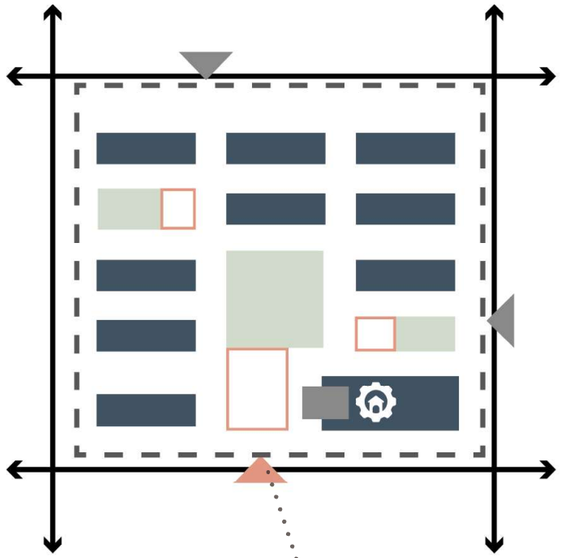


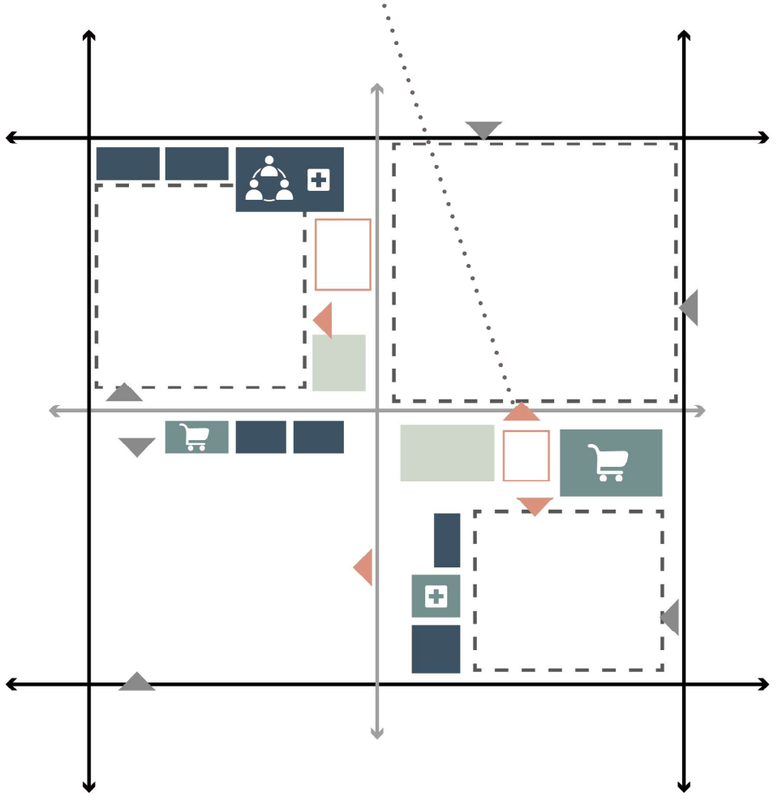
Fig.2.5.2 Prevention and control at neighborhood and community scale
Source: Author

5.2 General response at neighborhood and community scale

NORMAL SITUATION



Community scale

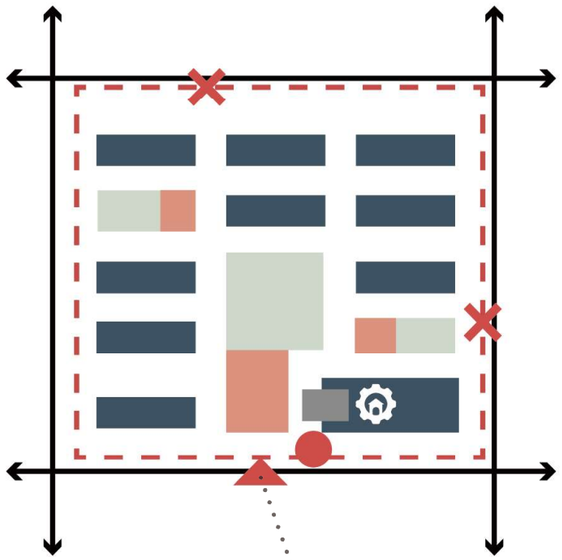


Neighborhood scale

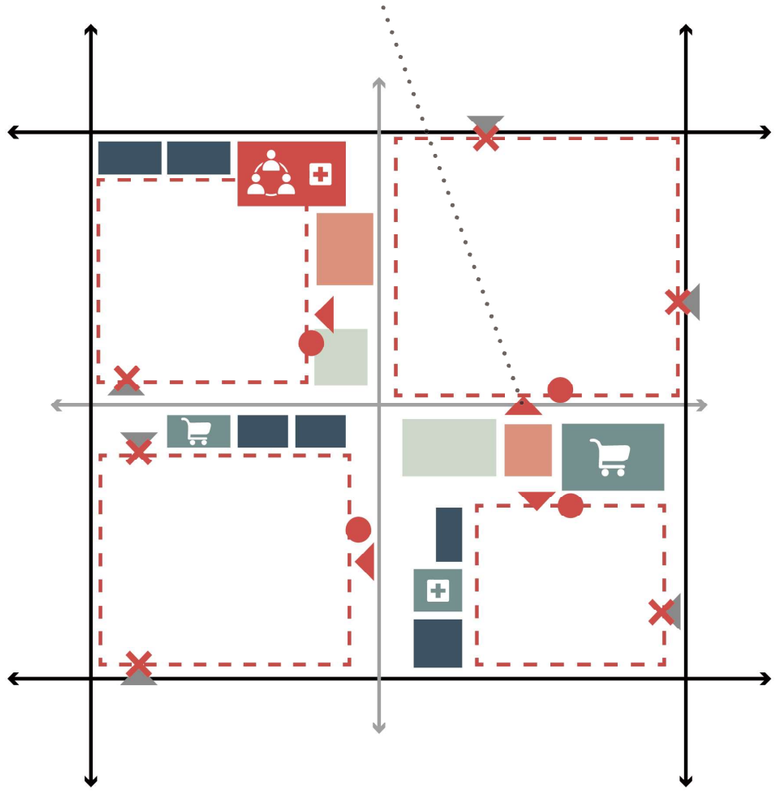
Open space
Collective green space
Gated community
Main entrance
Sub entrance
Doorman room
Community center or housing management company
Supermarket
Pharmacy
Neighborhood committee center and neighborhood health center

Fig.2.5.3 Plan in the normal situation
Source: Author

PANDEMIC SITUATION



Community scale



Neighborhood scale

Only one entrance and exit shall be reserved for a district. The old open residential areas are closed by temporary fences.

Material transportation or temporary construction of facilities

All personnel entering and exiting the community shall be subject to temperature measurement and registration

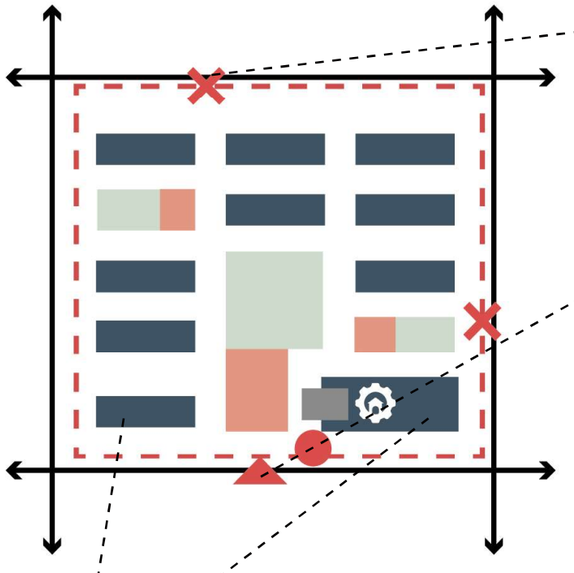
A place for neighborhood grids member to coordinate community prevention efforts and connect with civil society organizations

Supermarket control measures: only the group purchase without personal procurement services

Pharmacy control measures: only staff can buy medication at designated pharmacies

Fig.2.5.4 Response in the pandemic situation
Source: Author

5.3 Response activity map at community scale



Entrance and exit: supervision

Doorman room supervision

Temporarily set up a table at the gate

Guarded by community staff

Blocked by bikes

Blocked by fences

Blocked with a rope and a tent

Interior of residence: communication and disfection

Post the latest notice

Fully disinfect the public areas and corridors of the community

The community delivers supplies to the people who don't know how to shop online

Door-to-door health screening

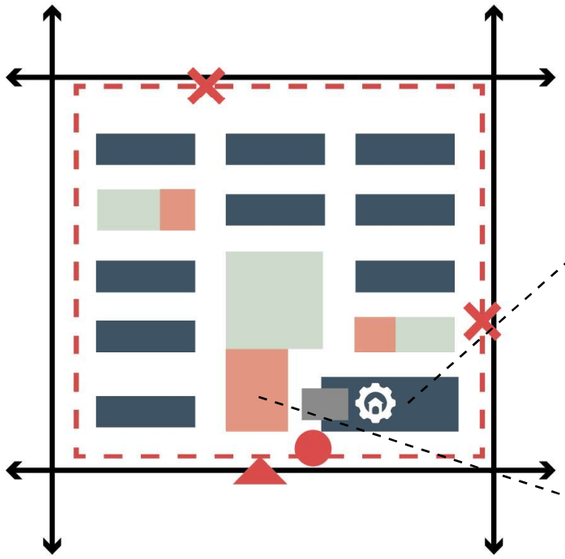
Courier entrance registration

Community residents access card

The staff is taking the temperature of the residents

Fully automatic atomization disinfection channel at the entrance

Photos in this page are from sources: http://news.hbtv.com.cn/p/1798427.html, http://news.cnhubei.com/content/2020-02/19/content_12755718.html, https://m.thepaper.cn/baijiahao_660093, https://baijiahao.baidu.com/sid=1658345449213902252&wfr=spider&for=pc, https://www.thepaper.cn/newsDetail_forward_6058275, https://china.huanqiu.com/article/9CaKrnKpjQW, https://kuaibao.qq.com/s/20200211AZNQQY00?refer=spider, https://kknews.cc/society/g4oor89.html, https://baijiahao.baidu.com/s?id=1696402418253032234&wfr=spider&for=pc, https://kknews.cc/zh-my/society/pvoy4o8.html, https://kknews.cc/zh-my/agriculture/63x8p5v.html, https://kknews.cc/zh-cn/society/ljayoke.html)



Inside the community center: 1. for coordinating community prevention efforts and connecting with civil society organizations; 2. for communication with residents; 3. for material distribution

Volunteers distribute and pack supplies at supermarket, pharmay, etc.

Volunteers distribute and pack supplies at community center

Phone contacting

open space: 1. for supervision; 2. for publication and communication; 3. for material distribution

"Contactless Delivery" Supplies Receiving Point

Picking up vegetables at community gate

Social distancing when picking up vegetables at sports field

Picking up vegetables on a staggered peak at open space

Seting up a tent for puting vegetables

Community trumpets broadcast notices

Supervision and publication

Photos in this page are from sources: http://news.hbtv.com.cn/p/1798427.html, http://news.cnhubei.com/content/2020-02/19/content_12755718.html, https://m.thepaper.cn/baijiahao_660093, https://baijiahao.baidu.com/sid=1658345449213902252&wfr=spider&for=pc, https://www.thepaper.cn/newsDetail_forward_6058275, https://china.huanqiu.com/article/9CaKrnKpjQW, https://kuaibao.qq.com/s/20200211AZNQQY00?refer=spider, https://kknews.cc/society/g4oor89.html, https://baijiahao.baidu.com/s?id=1696402418253032234&wfr=spider&for=pc, https://kknews.cc/zh-my/society/pvoy4o8.html, https://kknews.cc/zh-my/agriculture/63x8p5v.html, https://kknews.cc/zh-cn/society/ljayoke.html)

03 PROBLEM

1 Problematic community capacities seen from the response
2 Knowledge gaps in study
3 Problem statement
4 Research aim and questions

The fence blocked the road and there was a tent for entrance supervision.
Source: https://web.shobserver.com/news/detail?id=234112

Photos in this chapter are from sources: http://news.hbtv.com.cn/p/1798427.html, http://news.cnhubei.com/content/2020-02/19/content_12755718.html, https://m.thepaper.cn/baijiahao_660093, https://baijiahao.baidu.com/sid=1658345449213902252&wfr=spider&for=pc, https://www.thepaper.cn/newsDetail_forward_6058275, https://china.huanqiu.com/article/9CaKrnKpjQW, https://kuaibao.qq.com/s/20200211AZNQQY00?refer=spider, https://kknews.cc/society/g4oor89.html, https://baijiahao.baidu.com/s?id=1696402418253032234&wfr=spider&for=pc, https://kknews.cc/zh-my/society/pvoy4o8.html, https://kknews.cc/zh-my/agriculture/63x8p5v.html, https://kknews.cc/zh-cn/society/ljayoke.html); https://web.shobserver.com/news/detail?id=234112; https://new.qq.com/omn/20200207/20200207A0R7HL00.html; https://baijiahao.baidu.com/s?id=1660908999831304163&wfr=spider&for=pc; http://news.sznews.com/content/2020-03/07/content_22934854.htm

1 Problematic community capacities seen from the response

1.1 Spatial planning

Foremost, most residential communities have high densities, high plot ratios, low greening rates, and few open spaces, which are not conducive to neighborhood microclimate improvement and can increase the chances of spreading infectious diseases and prevent residents in home isolation from alleviating negative emotions (YU et al., 2020).

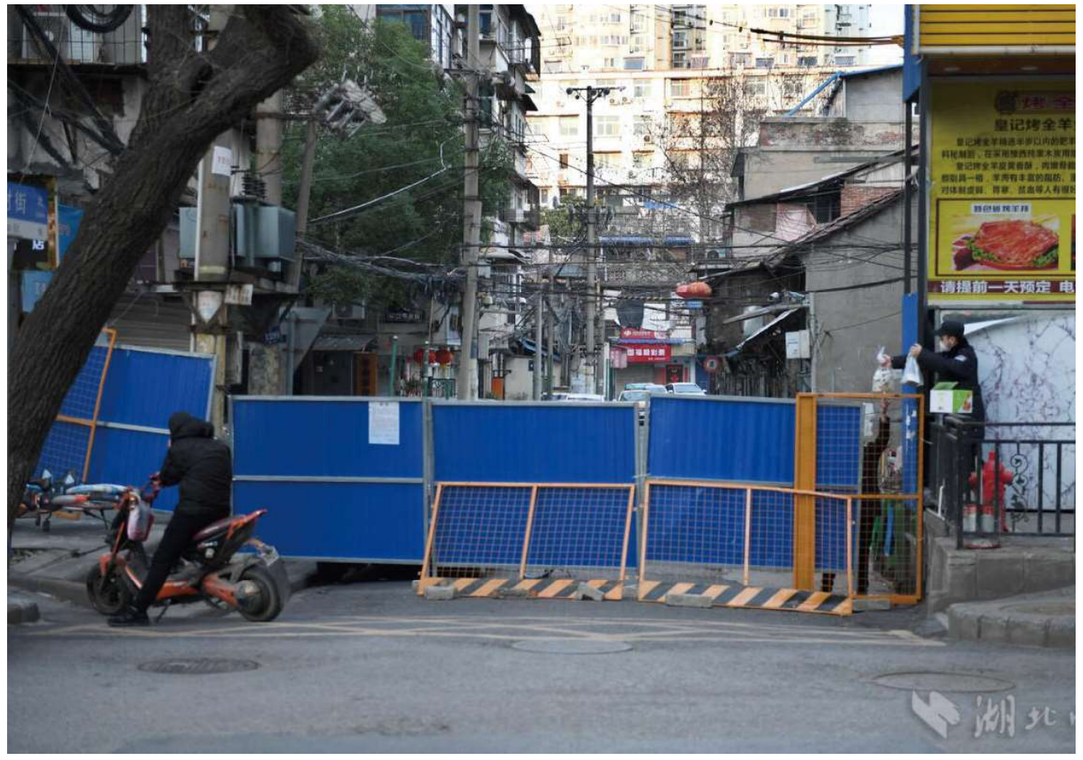
Next, there is a lack of emergency space planning in the community. First, the lack of open space in the community leads to insufficient emergency sites, and the lack of emergency plans also makes it difficult to convert public spaces. Secondly, the internal roads in the community are often occupied by commercial or private occupancy resulting in poor emergency roads (YU et al., 2020).

Finally, some neighborhoods are inadequately resourced with public facilities, such as the lack of a neighborhood pharmacy or community medical services, which affects the basic and normal needs of residents.

Poor built environment in older neighborhoods can increase the chance of spreading infectious diseases

Older communities with little greenery and open space prevent isolated residents from relieving negative emotions

Residents buy vegetables in front of the gate.



People passed daily necessities in front of the fence

1.2 Governance

Firstly, the community management and self-governance mechanism are not perfect. First, it is reflected in the lack of emergency plans or emergency plans that remain on paper without being rehearsed (XU et al., 2021). Second, the community has not considered cooperating with social organizations to cultivate volunteers to form a redundant force during normal times, so the community cannot respond in time when a public crisis suddenly occurs.

Then, there is a shortage of human resources in the community. Especially during strict community quarantine, a large variety of supportive services such as material delivery and disease monitoring are mainly undertaken by government staff and volunteers, but the number is far less than the workload, resulting in a heavy physical and psychological burden on them. With insufficient involvement of the public and private companies and no corresponding measures to promote multi-stakeholder cooperation, social cohesion can be weakened.

Lastly, information communication in the community is not timely and transparent enough, and the application of information technology is seriously lagging. This is demonstrated by the single channel for collecting and disseminating information by community workers, and the fact that residents are easily convinced by pandemic rumors.

The neighborhood grid workers help residents buy, pack and deliver daily staff

The community staff help residents with group purchases.

The neighborhood grid worker helps residents buy medicine

1.3 Human capital

Community residents' knowledge of disaster prevention and mitigation and their ability to help themselves are weak. For example, due to lack of knowledge, residents do not comply with disaster prevention regulations or residents are less proactive in participating in community volunteer services, which undermines community cohesion.

Vulnerable groups, such as the elderly and low-income families, are often less educated and less knowledgeable and need timely assistance from the community, otherwise, they are more likely to suffer greater shocks, which can exacerbate social segregation.

In addition, older communities with complex population composition and high mobility often have a weak sense of community belonging, causing low participation and group identification, which adversely affects the efficient implementation of community prevention activities.

Community workers deliver living supplies to seniors who cannot shop online

Community workers deliver meals to the poor elderly

2 Knowledge gaps in study

The impact of the corona virus on communities and their ability to cope with it has raised public concern about community resilience. However, there is a knowledge gap in the current research on community resilience in China.

The primary is the limited scope of studies. First, most domestic research has explored natural disasters (earthquakes, fires, etc.), with less focus on community resilience from a pandemic perspective, and less exploration of governance and human capital. Second, resilience assessment frameworks are numerous and complex, and few simpler and more operational assessment frameworks are available.

This is followed by little research and lack of practice on strategies. Few domestic studies have integrated spatial, governance, and community capital strategies, and there are few strategies on integrating planning for disaster emergencies with usual community building. Secondly, there is a lack of location-based practice, and most of the research focuses on proposing strategies and lacks concrete community practice in local contexts.

Dimensional division	针对社区类型	参考文献
Physical, institutional, demographic, economic factors	非特定类型	[17]
Community organizations, community residents, material space	城市社区	[4]
Social factors, management (system) factors, economic factors	非特定类型	[41]
Collective memory, diversity, adaptability	山区社区	[42]
Social capital, economic capital, human capital, material capital, natural capital	非特定类型	[43]
Connecting and caring, having resources, the capacity for change, disaster management, information and communication	非特定类型	[18]
Versatility, redundancy, ecological and social diversity, effective network connectivity, adaptability	城市社区	[28]
Climate disaster resilience, economic resilience, community resilience, organizational resilience, infrastructure resilience	城市社区	[44]
Ecological resilience, social resilience, economic resilience, technological resilience and organizational resilience	非特定类型	[45]
Technological resilience, organizational resilience, social resilience and economic resilience	保障房社区	[5]
Social resilience, economic resilience, institutional resilience, infrastructure resilience	非特定类型	[46]

资料来源：搜集相关文献资料的基础上自绘。

Fig.3.2.1 Domestic community resilience dimensional division
Source: Research Review and Prospect of Community Resilience: Concept, Dimension and Evaluation (CUI et al., 2018)

表 2-8 国内减灾防灾社区建设概况

时间	主导部门	Theme	主要思想及措施
2004	民政部	"Disaster Reduction into Communities" activities	社区是城市防灾减灾的基础，重视风险高发区社区的防护。
2006	国务院	National Overall Emergency Response Plan for Public Emergencies	强调社区为工作重点
2007	国务院	National 11th Five-Year Plan for Comprehensive Disaster Reduction	开展“全国综合减灾示范社区”建设活动
2010	国务院	May 12th is national Disaster Prevention and Mitigation Day	主题为“减灾从社区做起”
2010	国家减灾委	National Model Community Standards for Comprehensive Disaster Reduction	进一步指导各地开展社区综合减灾工作[82]
2011	国务院	National Comprehensive Disaster Reduction during the 12th Five-Year Plan Period	提出创建 5000 个“全国综合减灾示范社区”
2012	民政部	Guidelines for Establishing National Demonstration Communities for Comprehensive Disaster Reduction	进一步规范全国综合减灾示范社区创建管理
2015	民政部	Interim Measures for the Establishment and Administration of National Demonstration Communities for Comprehensive Disaster Reduction	确定 1390 个全国综合减灾示范社区

Fig.3.2.2 Domestic disaster reduction and prevention community construction
Source: Research on the Strategy of Old Community Space Transformation Based on Resilience Theory -- Taking Beijing as an Example (TIAN, 2020)

3 Problem statement

Deficiencies in building community resilience

Communities in metropolitan areas have played a key role in China's pandemic control as a key battleground for closed management. However, the spatial planning chaos, inappropriate governance and inadequate human capital revealed in the outbreak control have dramatically compromised the community's ability to handle the crisis, undermining the health and well-being of residents and causing social segregation.

This issue of community response in Wuhan heightened attention to community resilience. Nevertheless, there are many inadequacies in the existing research on community resilience in China. The first is the limited scope of research and the second is that there is little research on strategies and the need for more empirical validation.

New coronaviruses are still mutating and raging, and new infectious disease crises may also emerge in the future. How to improve the community's ability to cope with uncertainties is the subject of urgent research nowadays. In response to the above issues, the construction of community resilience will become the core.

Deficiencies in community resilience

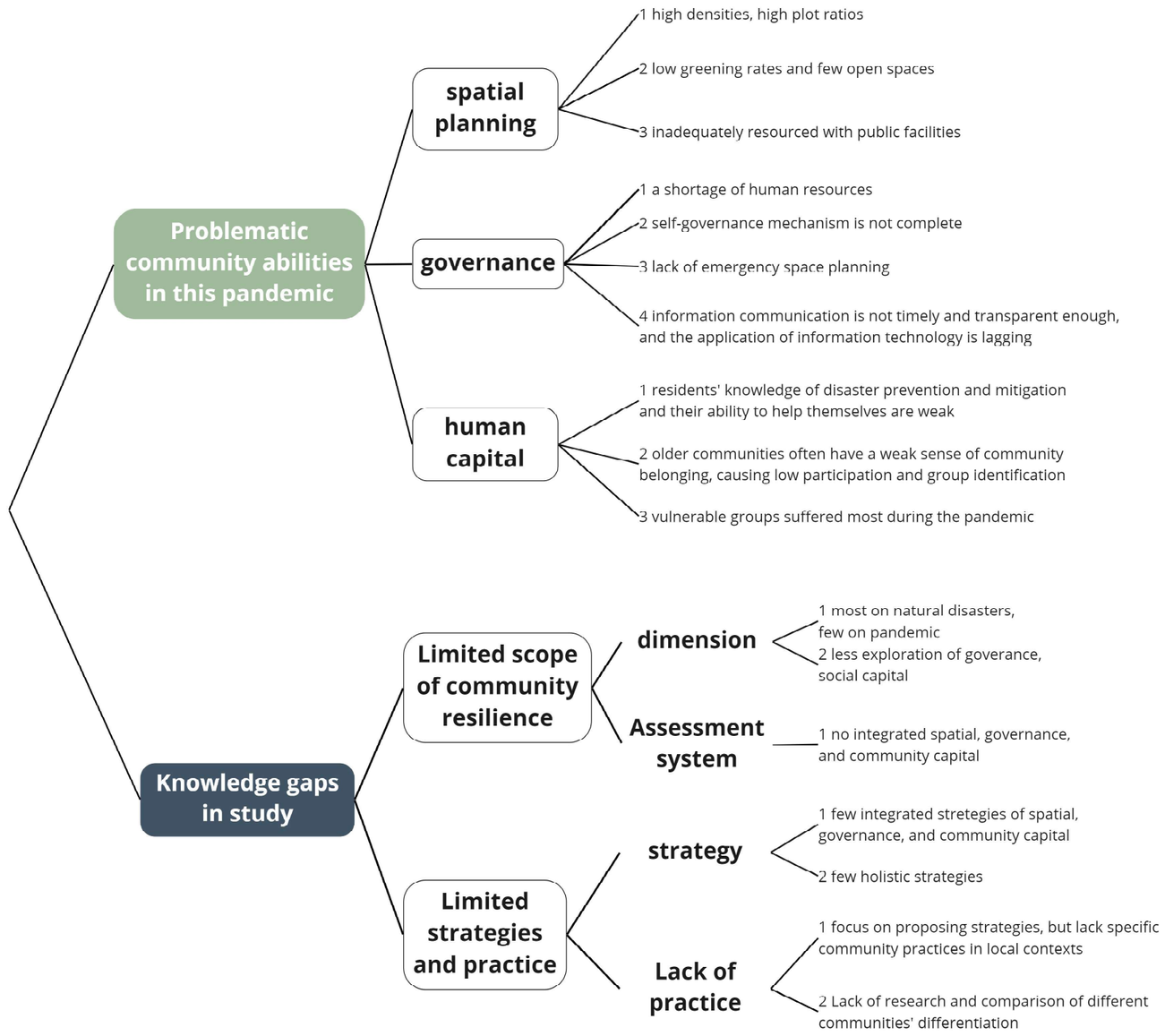


Fig.3.3.1 Problem statement: deficiencies in building community resilience
Source: Author

4 Research aim and questions

4.1 Research aim

This project aims to build an integrated strategy framework for improving community resilience in Wuhan in a long term, achieving a sustainable and livable urban environment, towards the goal of good health and well-being and sustainable cities and communities from SDGs (United Nations, n.d.). To achieve this goal, milestones of objectives are outlined below.

Firstly, it is crucial to understand comprehensively how the Wuhan communities respond to COVID-19 and how the remarkable factors involved affect community resilience.

Furthermore, combining Wuhan's actual response with domestic theoretical research, the building framework and measurement framework are put up with. Representative sites will be selected to test specific deficiencies in pandemic community resilience.

Lastly, possible targeted planning strategies are proposed after reviewing the evaluation and designing the vision. An integrated planning framework could be figured out. Then, location-based design is needed to explore the feasibility and effectiveness of planning strategies.

4.2 Research questions

CONTEXT

1 What are the most important Covid-19 community responses and their mechanisms in Wuhan?

PROBLEM

2 What problematic community abilities are exposed by Covid-19 response?

What can we learn from **Covid-19 response** in Wuhan to enhance **community resilience** in the long term by adopting **planning strategies**?

CONCEPTUALIZATION

3 What is the conceptual framework of building community resilience in Wuhan from the perspective of pandemic ?

4 What is the analytical framework for measuring pandemic community resilience ?

SOLUTION

5 How can the strategic planning interventions strengthen community resilience through vision?

6 How to improve integration and coordination between planning strategies by design?

Fig.3.4.1 Main research question and sub research questions
Source: Author

04 METHODOLOGY

1 Theoretical framework
2 Conceptual framework
3 Analytical framework
4 Methodology

Residents and vendors traded in a temporarily organized open-air vegetable market.
Source: https://kuaibao.qq.com/s/20200211AZNQQY00?refer=spider

1 Theoretical framework

Theories and supportive knowledge are summarized to form a theoretical framework, underpinning how to measure and enhance community resilience in the context of the pandemic in a dynamic process. The theoretical framework of this project comprises the following: the notion of the gated community in both Chinese and pandemic context; community resilience definitions; the assessment and building framework; and finally, reference of elements from urban resilience.

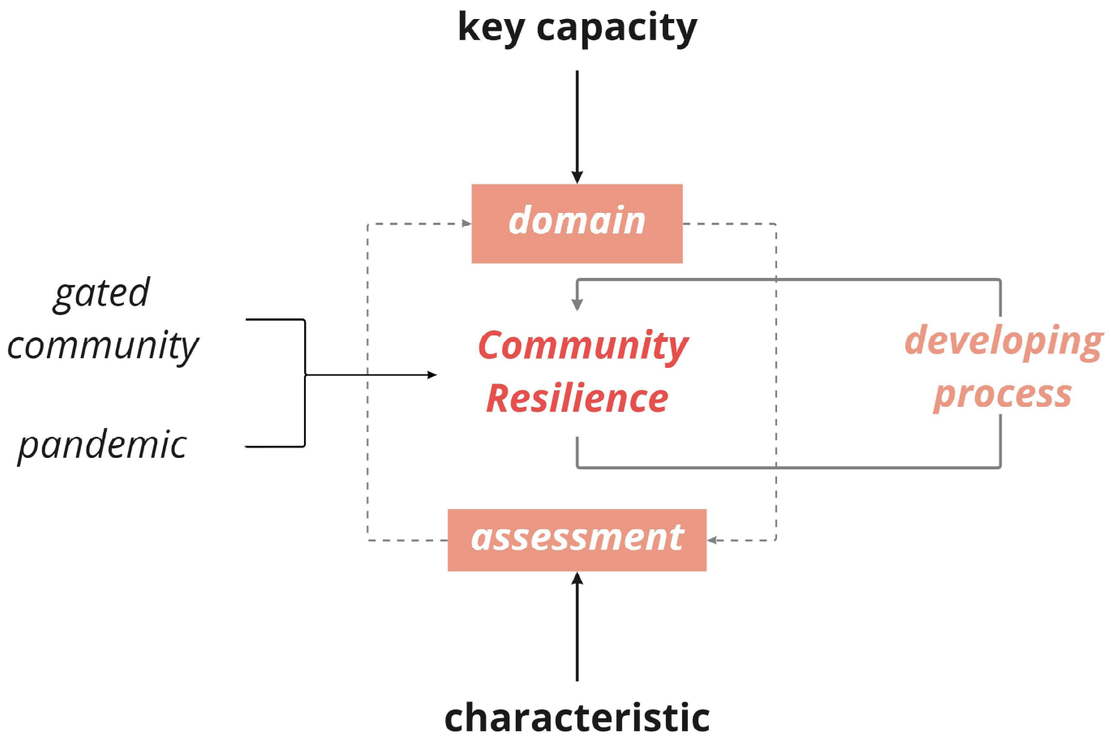


Fig.4.1.1 The theoretical framework
Source: Author

1.1 Gated community and pandemic

Gated community

A community is a social unit of people with certain common characteristics (norms, beliefs, customs, identities, etc.) that can share a sense of place in a certain geographical area or a communication platform in a virtual space (Wikipedia contributors, 2022).

In China, community refers mainly to the territorial type of social organization. In recent years, the unprecedented proliferation of gated communities in China has been far greater in scale and speed than in any other country (Miao, 2003). Gated communities constitute the main form of the urban fabric in China (Hamama & Liu, 2020). Currently, the main gated communities in China are work compounds and gated residential commercial areas (Li et al., 2021).

History and reason for its popularity

Because they are closely related to socio-spatial, cultural, political, and economic aspects, Gated communities in China are complex and multifaceted (Hamama & Liu, 2020). In retrospect, gated communities have evolved from walled residential wards to the enclosed work compounds of the socialist era (Xu & Yang, 2009). In the late 1980s, the start of China's market-oriented economic reforms witnessed the replacement of work compounds either by privatization or by gated, commercial housing with multiple options, high population densities, and flexible market transactions, making modern commercial enclosed housing the popular form of living from that time to the present (Li et al., 2021).

HUANG and LOW (2008) argued that in addition to profound political, economic, and social changes, the popularity and perpetuation of gated communities cannot be separated from the culture of collectivism that is rooted in Chinese society. This culture is believed to be more significant in the Confucian tradition and is the main difference between Chinese gated community building and Western culture (HUANG & LOW, 2008).

Neutral public perceptions

Even though it triggers fears of social isolation and exclusion, the general public adopts a neutral and inclusive attitude towards gated communities, which are not considered an issue in China. This is firstly due to China's unique political and cultural context (Douglass et al., 2012), which promotes collectivism as mentioned previously. Secondly, unlike some countries that reported a heavy reliance on autonomy, various departments and organizations of local government still bear the major responsibility for maintaining public safety, with neighborhood committees acting as grassroots governmental institutions at the residential community level (Li et al., 2021). Finally, many gated communities such as unit compounds and aging neighborhoods with complex demographic composition and loosely regulated access despite physical walls and gates can be considered as open communities.

Pandemic Influence

The new crown of the 2020 outbreak has rendered gated communities more intertwined with people's lives, pushing them into the public spotlight. The government had to implement a mandatory lockdown policy for certain areas. Strict entrance and exit screening were implemented for almost all residences, and some neighborhoods with severe outbreaks were closed, highlighting the advantages of gated communities for outbreak prevention and control. In research from Li et al. (2021), one interesting phenomenon occurs that a gated community, as a security zone, is more desirable after the outbreak of COVID-19 because of its usefulness in controlling access and excluding suspected outsiders.

1.2 Community resilience

Definition

Because of the multidisciplinary focus on community resilience, the existing literature has not fully unified the concept of community resilience. There have been different versions of the definition of community resilience in academia.

Castleden et al. (2011) identify community resilience as the ability or process by which communities adapt and function in the face of external disruptions. Schmidt-Sane et al. (2021) argue that community resilience can be conceptualized as a process, a result, or a set of properties. Norris et al. (2007) define community resilience as the process of connecting a network of adaptive capacity that can be viewed as a dynamic resource with adaptation following the occurrence of disruption or adversity.

CUI et al. (2018) believe that Chinese and Western studies have reached a consensus on community resilience: community resilience is both the ability of a community to maintain basic community functions under shocks such as disasters and crises, and the process of community preparation before, adaptation during, and recovery after a disaster.

Domains- capacities

The division of the dimensions of community resilience is varied in conjunction with the geographic and cultural characteristics of each locality.

In a study by Norris et al. (2007), there are four groups of resources for community resilience, including economic development, human capital, information and communication, as well as community competency. After summarizing numerous community resilience studies, CUI et al. (2018) concluded that despite the different types of communities targeted, the three domains of social, economic, and natural were the most common, with the infrastructural, physical, institutional, and human dimensions being the second.

In a summary, research addressing the dimensions of community resilience has at least five defined and measurable domains of community resilience, including social, economic, institutional, physical, and natural (Ostadaghizadeh et al., 2015).

Indicators-assessment

Considering the impact of the Chinese context and the pandemic on community resilience, the community resilience assessment framework refers to existing studies within China. First, due to China's unique community organization and administrative structure, indicators of community governance resilience require particular attention, as illustrated in the figures from CHEN and LV (2021) and YU et al. (2020). Second, because the spread of the pandemic is correlated with spatial distance, indicators of spatial planning are indispensable.

表2 国外社区韧性相关研究的维度划分

理论框架	缩写	社区类型	维度划分							
			Society	Economy	Nature	Infrastructure	Physical	Institution	People	Other
社区灾害韧性指数	CDRI	非特定类型	√	√	√		√		√	
地点灾害韧性	DROP	非特定类型	√	√	√	√				√
社区韧性模型	MNR	内陆社区	√	√	√					√
社区灾害韧性框架	CDRF	海滨地区	√	√			√		√	
社区多维韧性评价指标	PEOPLES	非特定类型	√	√	√	√	√	√	√	√
社区韧性建立活动	ABCR	非特定类型		√	√	√				√
行动导向韧性评价	AORA	城市社区	√	√	√		√	√		
基于社会适应力框架	SRBF	非特定类型	√	√	√					
韧性评价与决策系统	RCDS	非特定类型	√	√						√
社区基线韧性指标	BRIC	沿海社区	√	√		√		√		√
流与资源要素	FAR	非特定类型	√				√		√	√
社区韧性框架	CRDSA	非特定类型	√	√	√		√			√
八角价值模型	OVM	沿海社区	√	√	√			√		
复合韧性指数	CRI	非特定类型	√	√			√	√		
整体社区韧性评价方法	HCRAM	非特定类型	√	√	√	√		√		

资料来源：搜集相关文献资料的基础上自绘。

Fig.4.1.2 Western community resilience dimensional division
Source: Research Review and Prospect of Community Resilience: Concept, Dimension and Evaluation (CUI et al., 2018)

Table 3: Domains and their synonyms or sub-categories of community disaster resilience

Domain	Synonyms or sub-categories
Social	Human Capital, Lifestyle and Community Competence, Society and Economy, Community Capital, Social and Cultural Capital, Population and Demographics Environmental, Risk Knowledge
Economic	Economic Development, Society and Economy
Institutional	Governance, Organized Governmental Services, Coastal Resource Management, Warning and Evacuation, Emergency Response, Disaster Recovery
Physical	Physical Infrastructure, Infrastructural , Land Use and Structural Design
Natural	Ecosystem

Fig.4.1.3 Domains and their synonyms or sub-categories of community disaster resilience
Source: Community Disaster Resilience: a Systematic Review on Assessment Models and Tools (Ostadtaghizadeh et al., 2015)

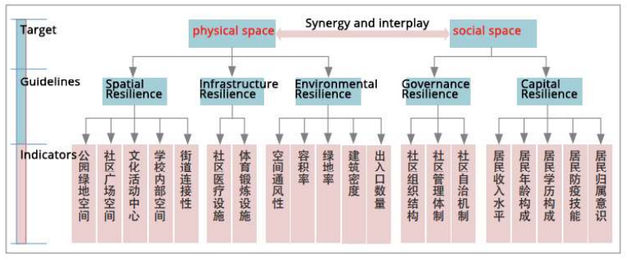


Fig.4.1.4 Evaluation framework for community resilience
Source: Planning and Construction of Resilient Community That Integrates Normal and Epidemic Situations (Y. YU et al., 2020)

表1 风险应对下社区韧性指标汇总表

Tab. 1 Summary of community resilience indicators under risk response

Classification of indicators	Types of indicators	Elements of indicators	Resilience characterist
Community governance	Public Management	Emergency organization training, rescue division of labor and command, emergency evacuation measures, security and protection" status, emergency plans, rescue personnel organization, emergency facilities redundancy	Redundancy Robustness
	Political Economy	Medical and health facilities, reserve of relief materials, emergency communication equipment, economic situation of communities, social groups, special status of communities	
	Demographic Composition	Population density, sex ratio, proportion of minors, proportion of the elderly, proportion of the sick and disabled, family structure	
Community space	Public Space	Open space utilization, spatial accessibility, arterial road, number of community entrances and exits, emergency places	Adaptability Redundancy
	Landscape Environment	Built environment quality, greening situation, building ventilation environment	
	Infrastructure	Accessibility of roads, storage space for epidemic prevention, garbage disposal facilities and medical facilities	
	Disaster Prevention Measures	Facilities for epidemic prevention and rescue shall be built, channels for epidemic prevention and rescue shall be unblocked, emergency response measures shall be taken, and emergency service facilities shall be provided	
Community organization	Organizational Approach	Community leadership, community building, and resident participation	Self-organizat ion
	Organizational Governance	Safeguard mechanism, preparation and response plan, big data information platform construction, emergency rescue efficiency, volunteer organization, disaster prevention publicity	
	Organizational Construction	Community "Workshop" co-governance co-management, community self-organization committee	

Fig.4.1.5 Summary of community resilience indicators under risk response
Source: Community Resilience Model Construction and Promotion Strategy under Epidemic Prevention and Control: A Case Study of Dufudi Community in Wuhan (CHEN & LV, 2021)

Framework-characteristics

The community function model drawn by YANG et al. (2019) suggests that community resilience curve fluctuations are split into three phases: pre-disaster preparation, mid-disaster response, and post-disaster recovery.

YU et al. (2020) categorized the resilient community construction that integrates normal and pandemic situations into three phases: pre-pandemic construction, mid-pandemic prevention and control, and post-pandemic recovery according to the preparedness of pandemic prevention and control and the degree of pandemic hazard. Among them, the pandemic construction phase requires a long time to improve space, facilities, environment, governance, and capital resilience. After a public health event, communities engage in short-term measures to resist. In the recovery phase, communities need to adapt and develop.

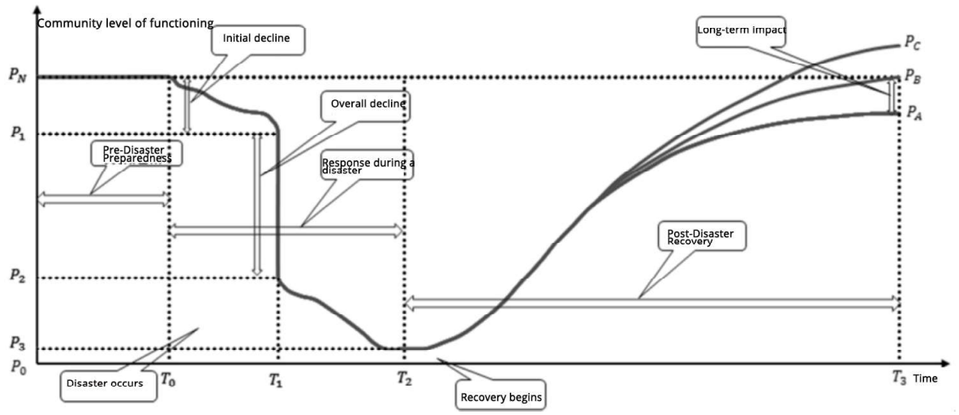


Fig.4.1.6 A model of community functional change
Source: A review on community resilience to natural disaster (YANG et al., 2019)

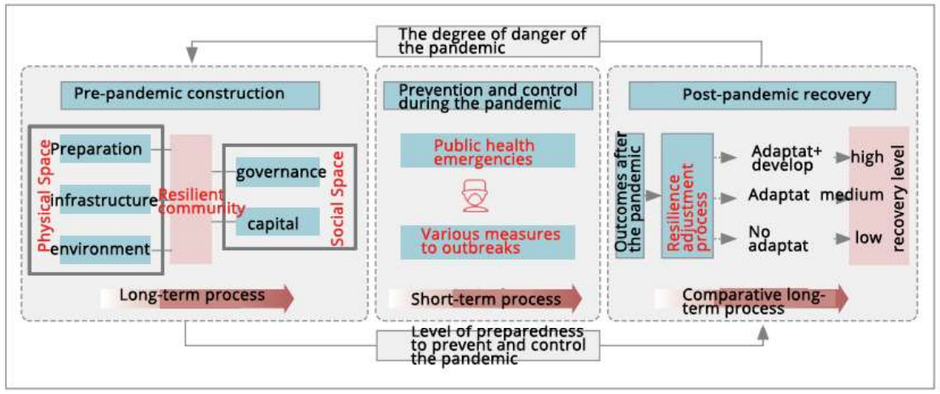


Fig.4.1.7 The construction framework for community resilience
Source: Planning and Construction of Resilient Community That Integrates Normal and Epidemic Situations (Y. YU et al., 2020)

Elements from Urban Resilience

As already mentioned, community resilience is both a continuation of urban resilience at scale and a component of urban resilience, so elements of urban resilience are informative for community resilience.

In a study by Opitz-Stapleton et al. (2011), the elements necessary to successfully build and sustain urban systems that enable resilient cities to survive a wide range of challenges include redundancy, flexibility, the ability to reorganize, and the ability to learn. To be specific, redundancy refers to a city's having multiple systems available to provide similar functions that can replace a disrupted system; flexibility describes a city's ability to absorb disruptions and mitigate shocks without allowing disaster thresholds to be exceeded; reorganization capacity means a city' capacity to adapt to change and evolve when conditions are constantly changing; and finally, learning capacity refers to a city's availability to learn from and absorb past experiences and prevent mistakes from being repeated in the future (Opitz- Stapleton et al., 2011).

Galderisi (2014) draws an integrated model of urban resilience, he also divides it into three phases: prevention, response, and recovery. Robustness, learning capacity, innovation, efficiency, and diversity in the model can be seen as characteristics and goals for the different stages.

Fig.4.1.8 Elements of urban resilience
Source: Building Resilience to Climate Change in Asian Cities (Opitz-Stapleton et al., 2011)

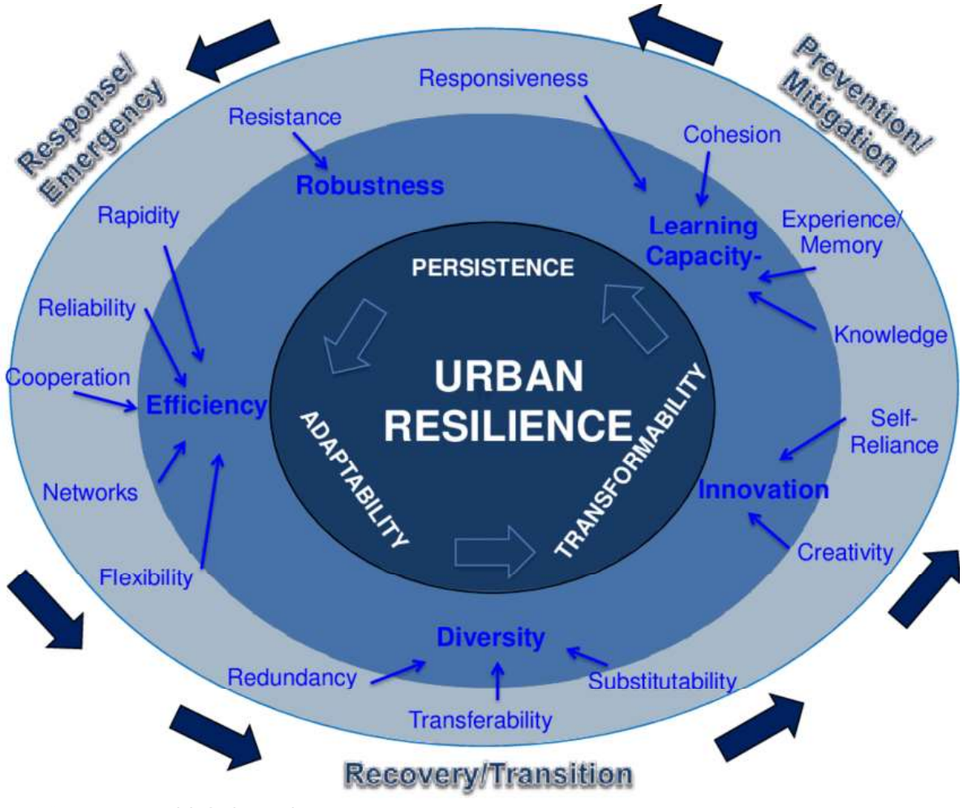


Fig.4.1.9 Integration model of urban resilience
Source: Urban resilience: A framework for empowering cities in face of heterogeneous risk factors (Galderisi, 2014)

2 Conceptual framework

The purpose of this section is to select a framework for community resilience building in Wuhan that is suitable for the pandemic perspective, taking into account the actual situation of community management in Wuhan during the pandemic and theoretical summary of community resilience. Then it can support the evaluation and strategies that follow. The conceptual framework is shown in the figure below.

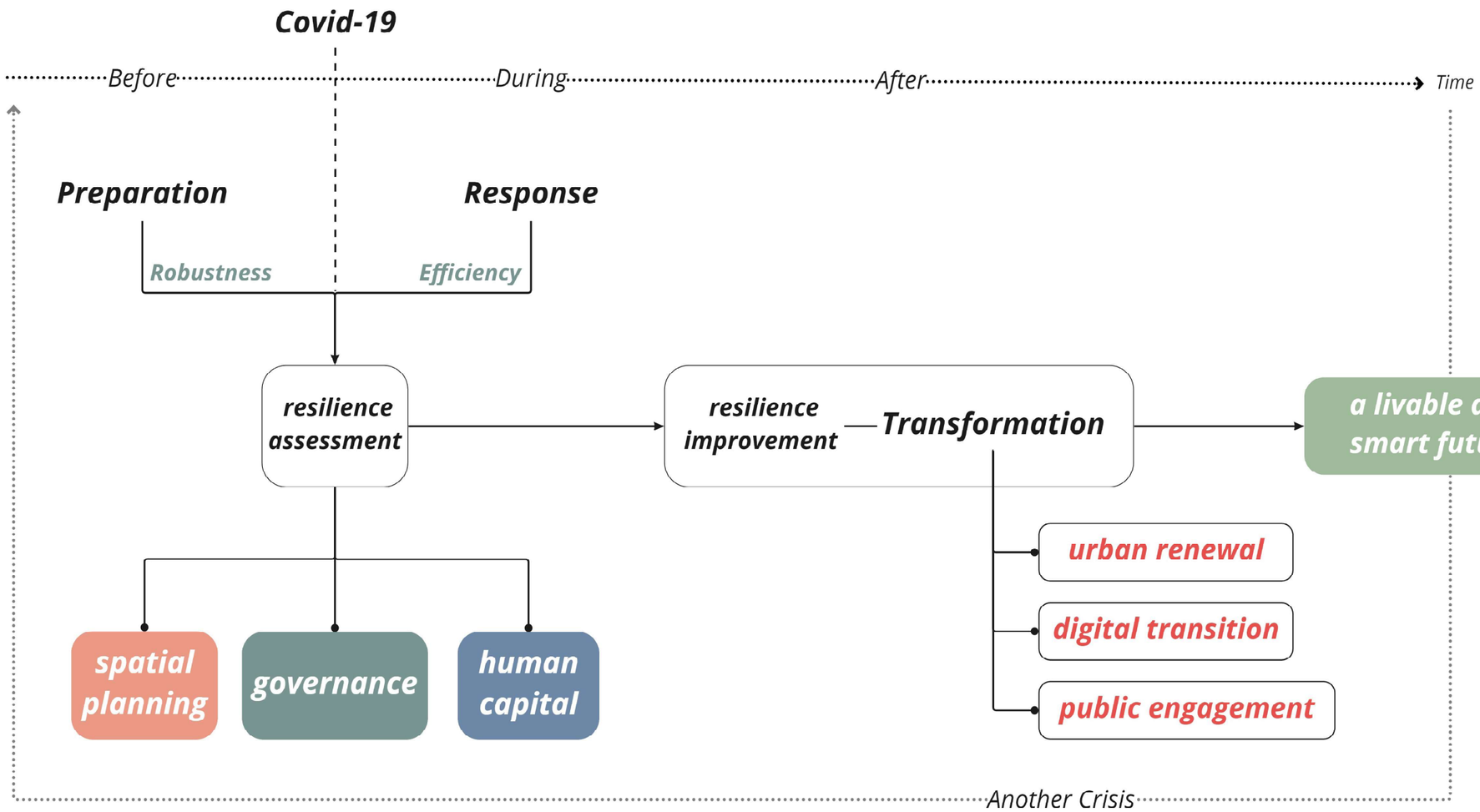


Fig.4.2.1 The conceptual framework for building pandemic community resilience across three stages
Source: Author

2.1 Key capacities of community resilience

Spatial Planning: Community spaces are natural environments and public spaces that residents need for their daily activities. The built environment and green space are critical to the microclimate circulation of the area, and also have importance on residents' mental health. Open spaces include plazas and internal streets, which not only provide residents with a venue for social exercise during normal times but also play a great role as an emergency site in times of emergency. Community infrastructure includes medical, pharmacy, supermarket and other facilities that offer the community the necessities to respond to public health events.

Governance: Community governance is critical to prevention and control and to improving community cohesion. A well-functioning emergency management mechanism and self-governance mechanisms with subdivided responsibilities are essential elements for communities to be capable of reacting quickly in the occurrence of emergencies. Next, combining bottom-up self-organization with more diverse subjects taking the initiative will alleviate the lack of human resources as opposed to relying only on top-down administrative governance. Finally, information is a key resource for risk warning, risk communication, and risk decision-making (X. YU, 2021), and communication is an invaluable tool for promoting community solidarity and fighting the pandemic together.

Human capital: Human capital includes first the demographic structure of the community, the income level. Then it consists of the level of education and knowledge, such as the knowledge of disasters and the ability of residents to help themselves. Finally, it involves social relationships and a sense of belonging.

Human capital relates to aspects related to the urban economic and social development environment such as residents' education level and income, which are more stable (Y. YU et al., 2020). However, human capital can still be improved by increasing residents' knowledge and promoting community networks, etc.

2.2 Phases and objectives of resilience building

The building of community resilience needs to emphasize the holistic approach, which revolves in the cycles of the system. It also suggests that community resilience is an uninterrupted dynamic process, with different goals to be achieved at each stage.

At the very beginning of the long preparation phase, the robustness of capacity is the goal, preventing potential hazards. Then a sudden public health emergency occurs. During this short response phase, communities need to be flexible and efficient in resisting and adapting to external disruptions. Then comes the moderately long transition phase, where the community needs to learn lessons and identify future trends to begin the transformation. This phase can also be seen as preparation for the next crisis.

In the end, the ultimate goal of liveability and smart living is achieved through the adoption of integrated strategies during the transition. Community resilience is improved in the process and is robust enough to deal with potential threats in the future.

3 Analytical framework

Based on the conceptual framework, the analytical framework needs to spotlight the indicators that have a greater impact on community resilience building in the context of the pandemic.

First, the indicators should be targeted, addressing the real occurrence of the outbreak in Wuhan. Second, the indicators should be systematic, covering social, environmental, and economic dimensions, and including the three phases of preparedness, response, and transformation. Then, the indicators should be scientific, requiring a combination of qualitative and quantitative analysis. Finally, the indicators should be actionable and convenient to collect and analyze.

Dimension	Scale	Primary Indicators	Secondary Indicators
spatial planning	*neighborhood*	**public space**	system of open space system of green space system of sports field
		public facility	medical(aging) facility commercial facility comprehensive center
		infrastructure	delivery facility street furniture supporting infrastructure (Parking, water, electricity, communication infrastructure etc.)
		traffic	pedestrian & cycling network
	community	**public space**	open space green space sports field
		Building	density quality
		infrastructure	street furniture supporting infrastructure (Parking, water, electricity, communication infrastructure etc.)
		traffic	pedestrian & cycling network entrance and exit
governance	*neighborhood*	**governance structure**	type of actors degree of engagement
	community	**Emergency management**	self-governance mechanism emergency plan
		Information and communication	information channels communication activities
human capital	*neighborhood*	**Economic basis**	industry structure and diversity
	community	**Demographic composition**	Aging rate incomes' level residents' knowldege and skills social activities
		Social network	residents' organizations commuity relationships sense of belonging

Fig.4.3.1 Analytical framework for community resilience
Source: Author

4 Methodology

4.1 Methodology framework

Fig.4.4.1 Methodology framework
Source: Author

4.2 Methods

Observation

DESCRIPTIONS
It aims to dive into Wuhan local context during a specific period to study pandemic community response and find out general problematic community abilities.
OUTCOME

1. Cultural and social-economic contexts, including urban development, gated community paradigm, the hierarchy of community management, etc.
2. Covid response measures and their mechanisms and characteristics
3. a preliminary summary of problematic community abilities

DATA RESOURCES
Newspapers: Wuhannews, Cnhubei, People's Daily, CCTV NEWS, TouTiao, etc.
Reports: COVID-19 Wuhan Guidance Papers, Fighting COVID-19: China in Action, etc.
Literature: journal articles about Wuhan urban community experience of COVID-19 prevention and control etc.
Documentaries: Days and Nights in Wuhan, Wuhan Breathing, etc.
Social media: WeChat platform, Weibo, Donghu Community Web Forum, etc.

Spatial analysis

DESCRIPTIONS
The purpose of this method is to refine the study scope of community response from the perspective of the built environment, deepening the understanding of relationships and conflicts between Covid response and community space.

OUTCOME
1. Community-built environment maps with photos, regarding function, infrastructure, open space, etc.
2. Spatial adaption maps with photos during the pandemic
3. Problematic community abilities from the perspective of spatial planning

DATA RESOURCES
Geographic data: AMAP, Baidu Map, Tianditu, etc.
Newspapers: Wuhannews, Cnhubei, People's Daily, CCTV NEWS, TouTiao, etc.
Documentaries: Days and Nights in Wuhan, Wuhan Breathing, etc.

Stakeholder analysis

DESCRIPTIONS
This method is used to refine the study field of community capacities from the perspective of governance and human capital, increasing the comprehension of tensions and potential threats between pandemic response and community ability.

OUTCOME
1. Stakeholders' interest and power diagrams and relationship network
2. Demographic structure of residents and relevant knowledge levels etc.
3. Problematic community abilities from the perspective of governance and human capital

DATA RESOURCES
Literature: journal articles about Wuhan urban community experience of COVID-19 prevention and control; journal articles about Wuhan responding policies to pandemic
Newspapers: Wuhannews, Cnhubei, People's Daily, CCTV NEWS, TouTiao, etc.
Documentaries: Days and Nights in Wuhan, Wuhan Breathing, etc.

Case study

DESCRIPTIONS
It means seeking references from many existing strategies in China and abroad, and drawing up a list of strategies that can be applied to the construction of Wuhan's community resilience.

OUTCOME
1. References in a range of planning strategies
2. Strategy toolkit

DATA RESOURCES
Reports: Cities and Pandemics: Towards a more just, green and healthy future; Integrating health in urban and territorial planning, etc.
Literature: books about community resilience; journal articles about domestic and other countries' strategies in building community resilience, etc.
Newspapers: Wuhannews, Cnhubei, People's Daily, CCTV NEWS, TouTiao, etc.

Literature review

DESCRIPTIONS
The literature review aims to find theoretical underpinning for the project development. First, it identifies suitable theories such as community resilience for conceptualization. Then, by summarizing the domestic theoretical research and practice, combined with the actual situation of Wuhan, it refines the conceptual framework and analysis framework of community resilience suitable for the Wuhan pandemic perspective.

OUTCOME
1. a conceptual framework of building pandemic community resilience in Wuhan, focusing on process development and criteria/goals of each stage
2. an analytical framework of pandemic community resilience, combined with qualitative indicators and quantitative indicators

DATA RESOURCES
Literature: books about community resilience; journal articles about definitions, domains, and assessments of community resilience; journal articles about Wuhan urban community experience of COVID-19 prevention and control
Newspapers: Wuhannews, Cnhubei, People's Daily, CCTV NEWS, TouTiao, etc.

Policy analysis

DESCRIPTIONS
It can first summarize the policies during the pandemic and provide contextual understanding for community outbreak prevention and control measures. Then, future planning policies can indicate the importance of resilient community development and the direction of urban renewal.

OUTCOME
1. Policy timeline of pandemic measures
2. Policy guidance on future community building

DATA RESOURCES
Official website: Wuhan Government, Wuhan Municipal Health Commission etc.
Literature: journal articles about Wuhan urban community experience of COVID-19 prevention and control; journal articles about Wuhan responding policies to pandemic
Newspapers: Wuhannews, Cnhubei, People's Daily, CCTV NEWS, TouTiao, etc.
Documentaries: Days and Nights in Wuhan, Wuhan Breathing, etc.

Vision design

DESCRIPTIONS
The design of the vision guides the development of a resilient community appropriate to the Wuhan context. Neighborhood-scale planning strategies and community-scale design can achieve integration toward a unified vision.

OUTCOME
1. A vision of a livable and smart future
2. Specific principles of the vision

4.3 Timeline

The timeline in the figure on the right shows the main actions. These activities are divided into five phases. The project evolves through this process to achieve different research objectives responding to research questions.

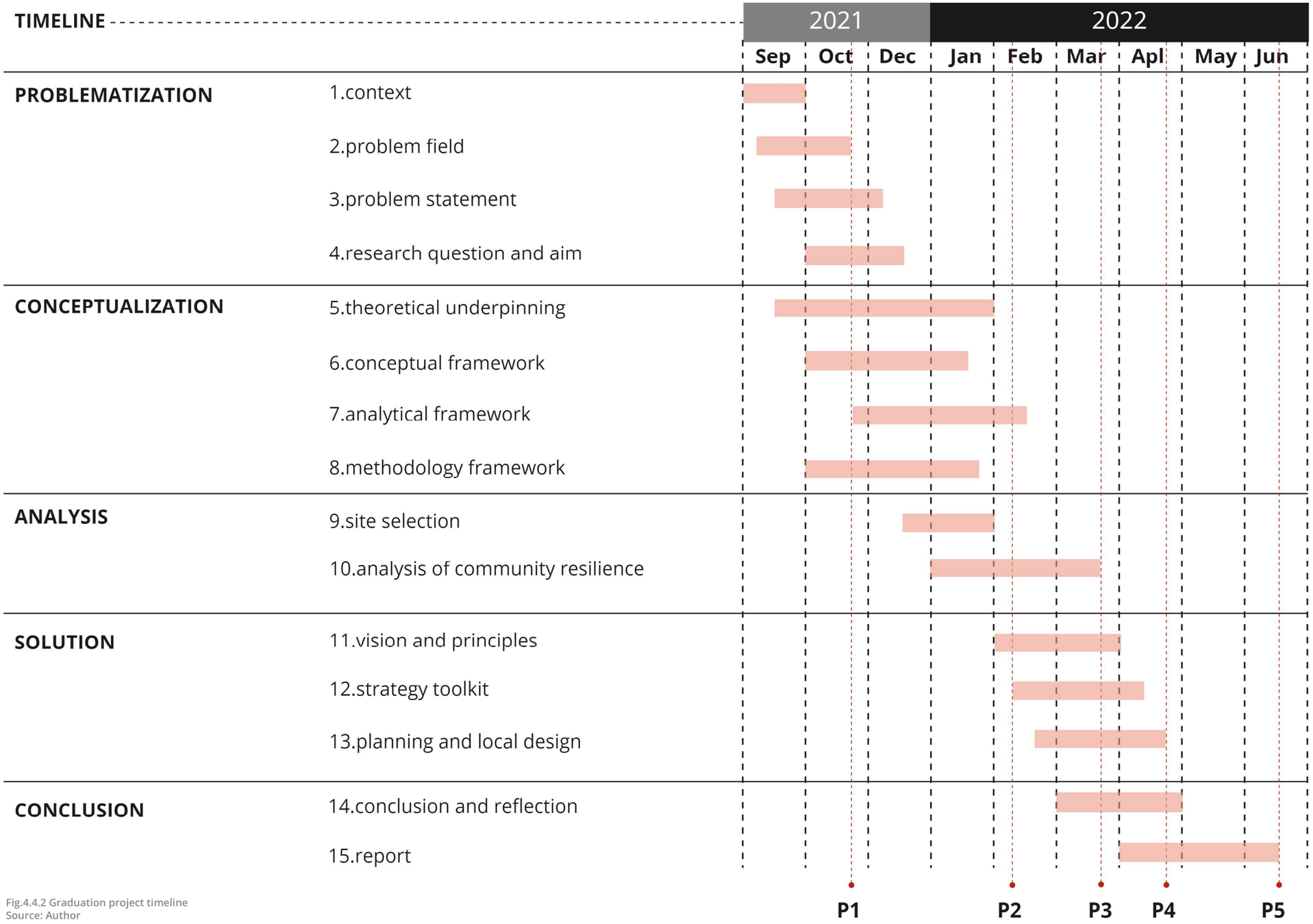


Fig.4.4.2 Graduation project timeline
Source: Author

05 ANALYSIS

1 Location selection
2 Old Community VS Modern Community
3 The old community
4 The modern community
5 Summary of community resilience
6 Case selection: the old community

The disinfection operation is being carried out in the old and poor community.
Source: http://ex.chinadaily.com.cn/exchange/partners/80/rss/channel/cn/columns/o87wjf/stories/WS5e30ffc4a3107bb6b579c135.html

Photos in this chapter without source credit are all taken by the author.

1 Location selection

Fig.5.1.1 Districts of Wuhan
Source: Author

There are three main reasons to select these two communities as case.

Firstly, comparion of different typologies of communities makes strategies more universal. Next, some references also divide the neighborhood into old and new communities for the study so the silimar classification are taken in this study. Last, selected communities have more available data, especially for time-sensitive information during the outbreak.

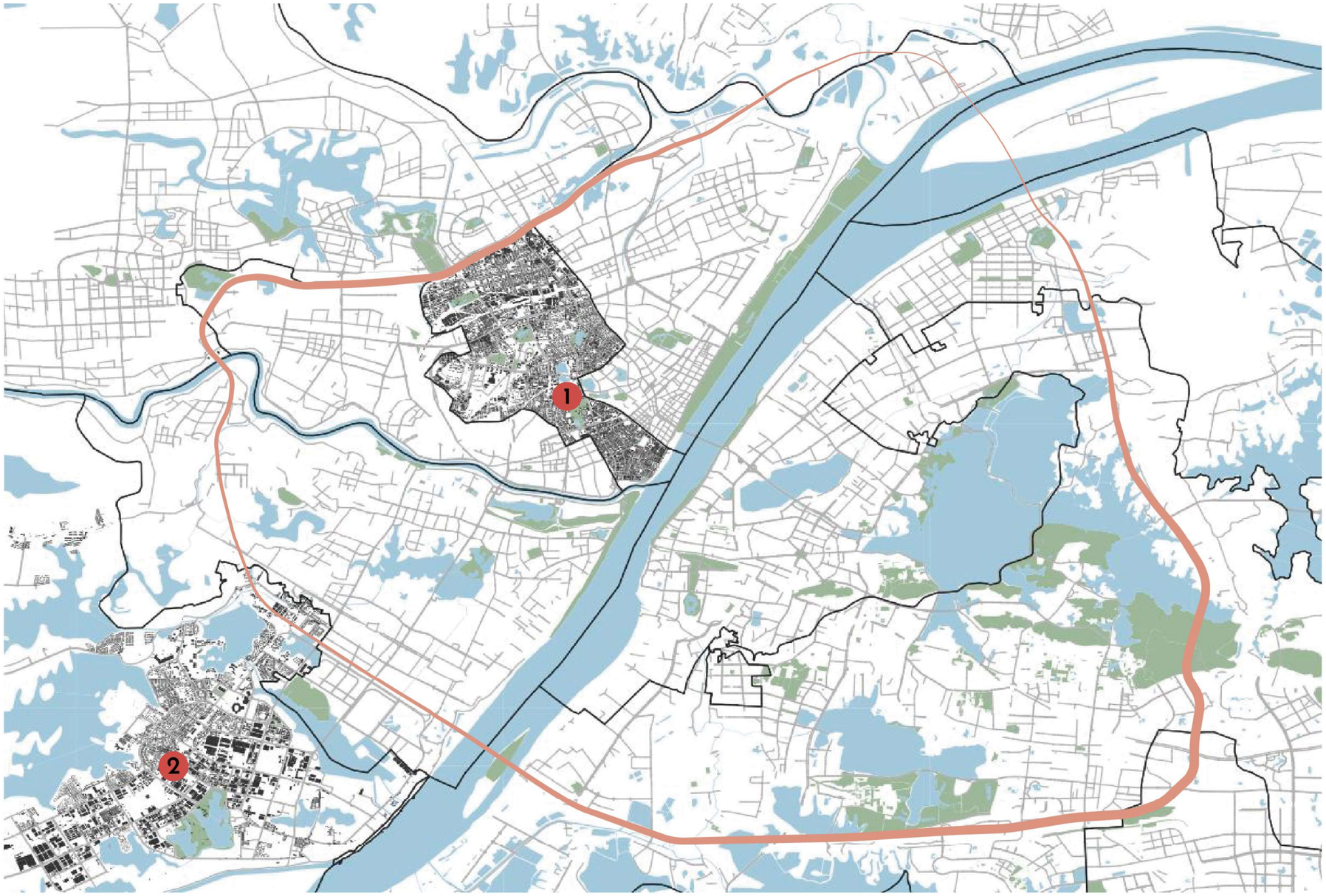


Fig.5.1.2 Two selected communities
Source: Author

Community No. 1 is an open and old community, located in the central city of Wuhan, with two dozen medium-height residential buildings.

Community No. 2 is a newly built community, located in Wuhan's new economic development zone, with high-rise towers.

	1 *Old Community*	2 *Modern Community*
Name	Wansongyuan northern xiaoqu	Jinsegangwan xiaoqu
Year of construction	Before 2000	After 2000
Community typology	a medium-rise compound	a high-rise residential complex

2 Old Community VS Modern Community

Fig.5.2.1 The comparision of old community and modern community
Source: Author

On the neighborhood scale, the old community belongs to the Qing Song community on Wan Song Street. The neighborhood is situated in the downtown area of Wuhan, with a jurisdictional area of 0.09 square kilometers and a permanent resident population of 10,849.

The new community belongs to the Xindu neighborhood of Zhuankou Street. This community is in the new development area of Wuhan, with a jurisdictional area of 10.5 square kilometers and a permanent resident population of 5,905.

2 Old Community VS Modern Community

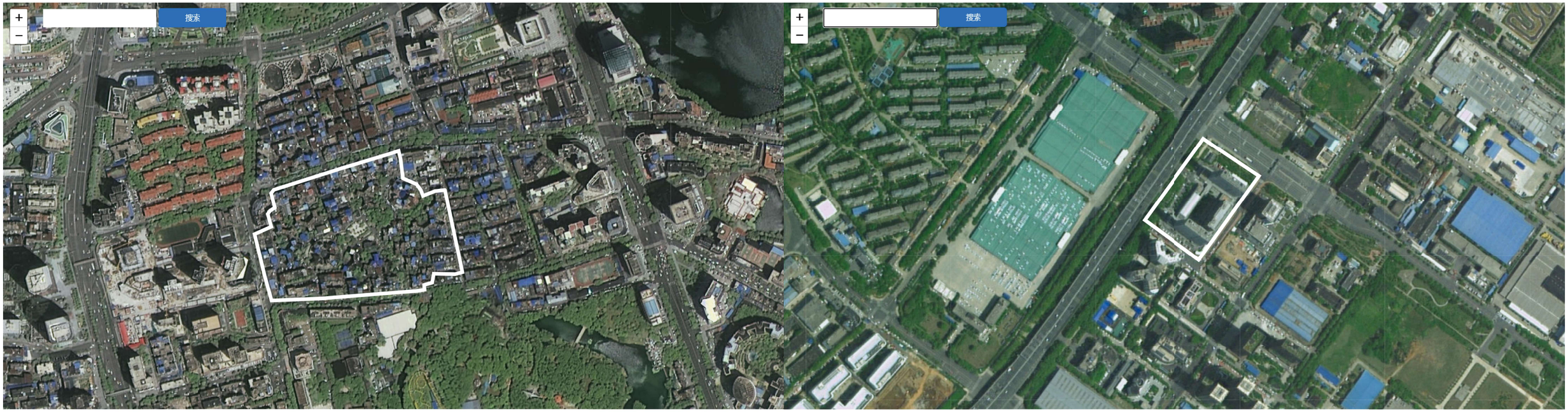


Fig.5.2.2 The comparision of old community and modern community

Source: Author, based on AMAP

	1 *Old Community*	2 *Modern Community*
Built age	1996	2019
Households	1599	1542
Floor area	≈ 65000 m^2	17294 m^2
Building density	medium-rise	high-rise
Maintenance management	unregulated	regulated
Community infrastructure	decayed	well-kept
Community boundary	Open	strictly regulated

At the community scale, the two communities are at completely different levels of development, as the table shows.

Even though the number of resident households in the two communities is similar, the density of housing and the type of residential buildings differ greatly. In terms of maintenance, the old district has no property company and the infrastructure is in a state of disrepair, while the new one has a professional property company that manages the infrastructure as well as regulates the access of the residents.

3 The old community

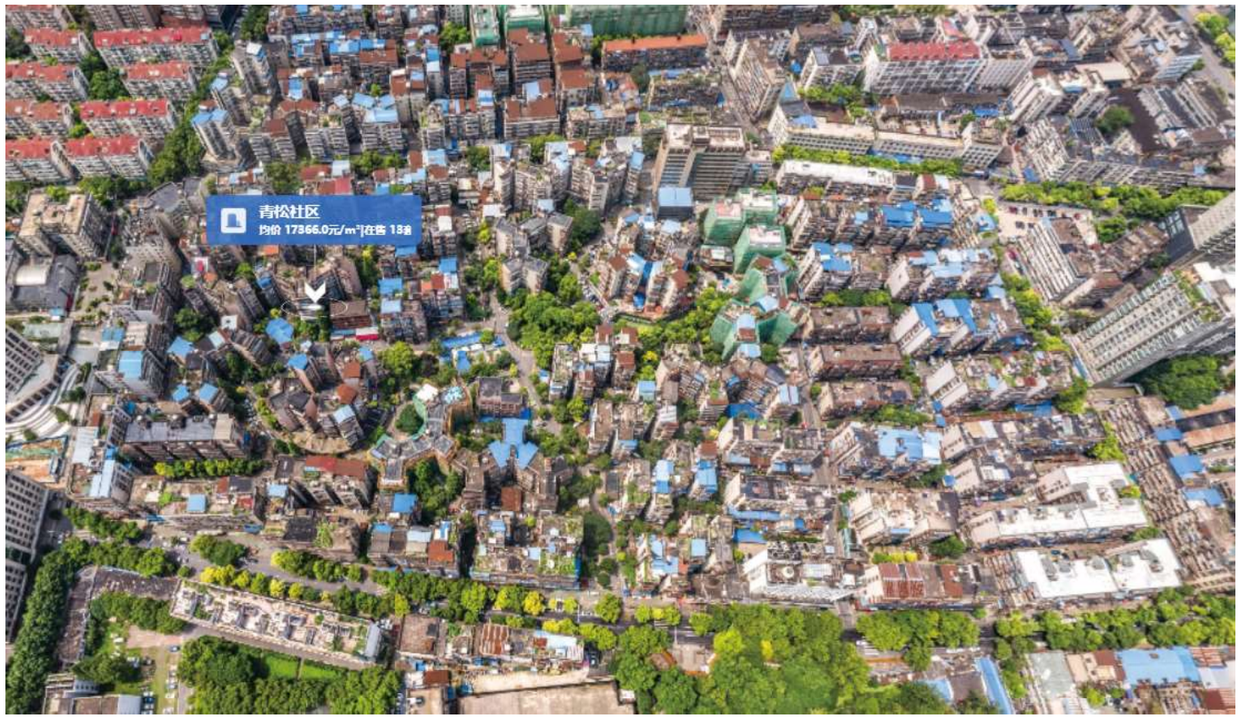
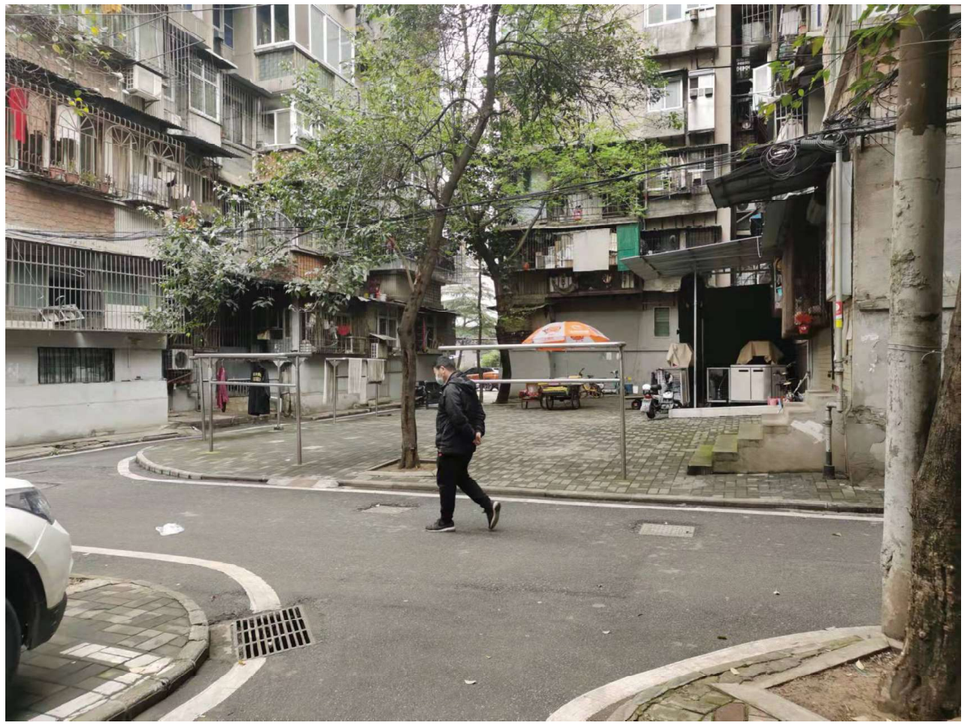


Fig.5.3.1 The bird view of the old community
Source: https://wuhan.anjuke.com/community/view/996674

1 ***Old Community***

Built age	1996
Households	1599
Floor area	≈ 65000 m^2
Building density	medium-rise
Maintenance management	unregulated
Community infrastructure	decayed
Community boundary	Open



3.1 Neighborhood context——neighborhood scale

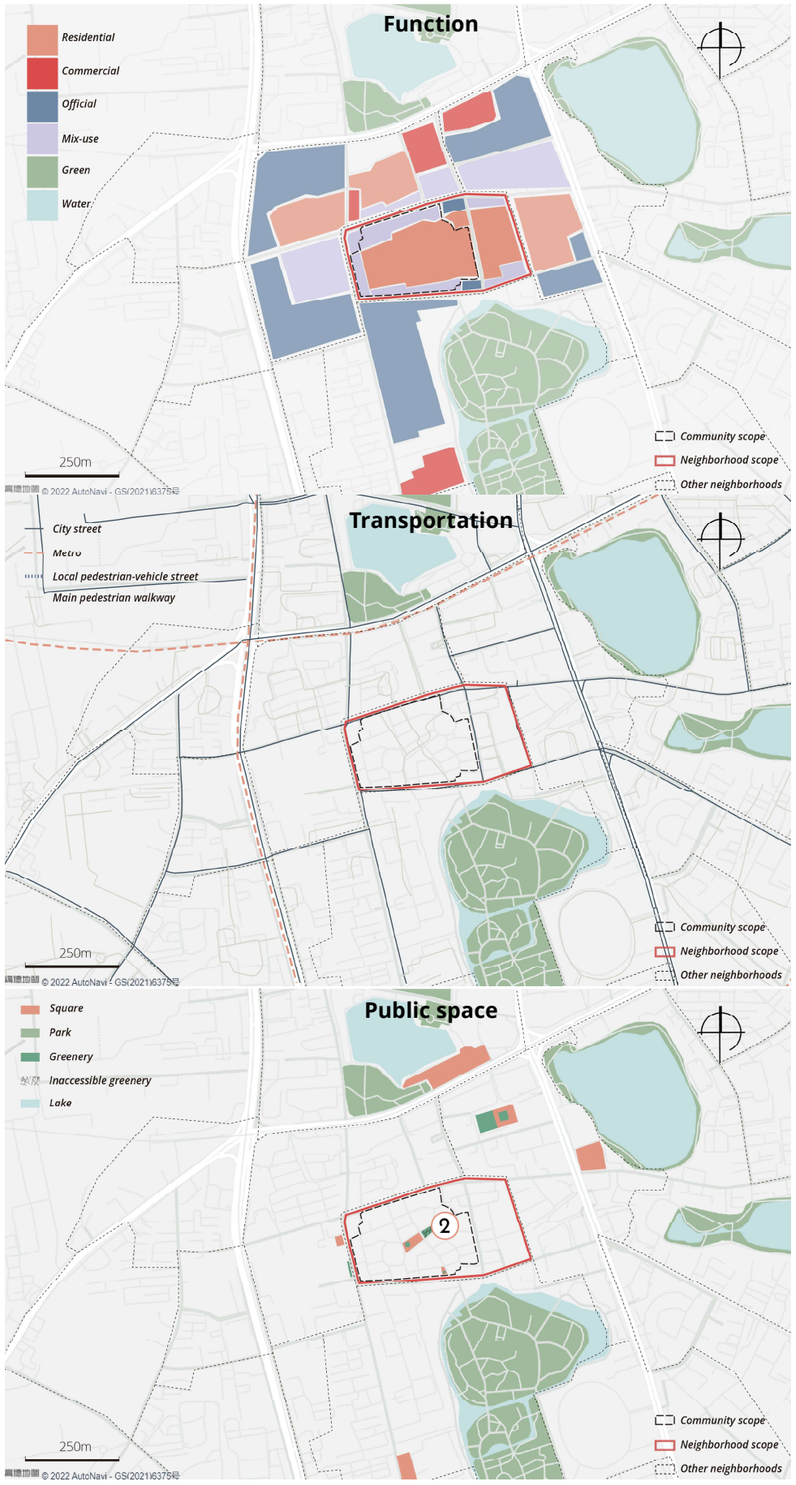
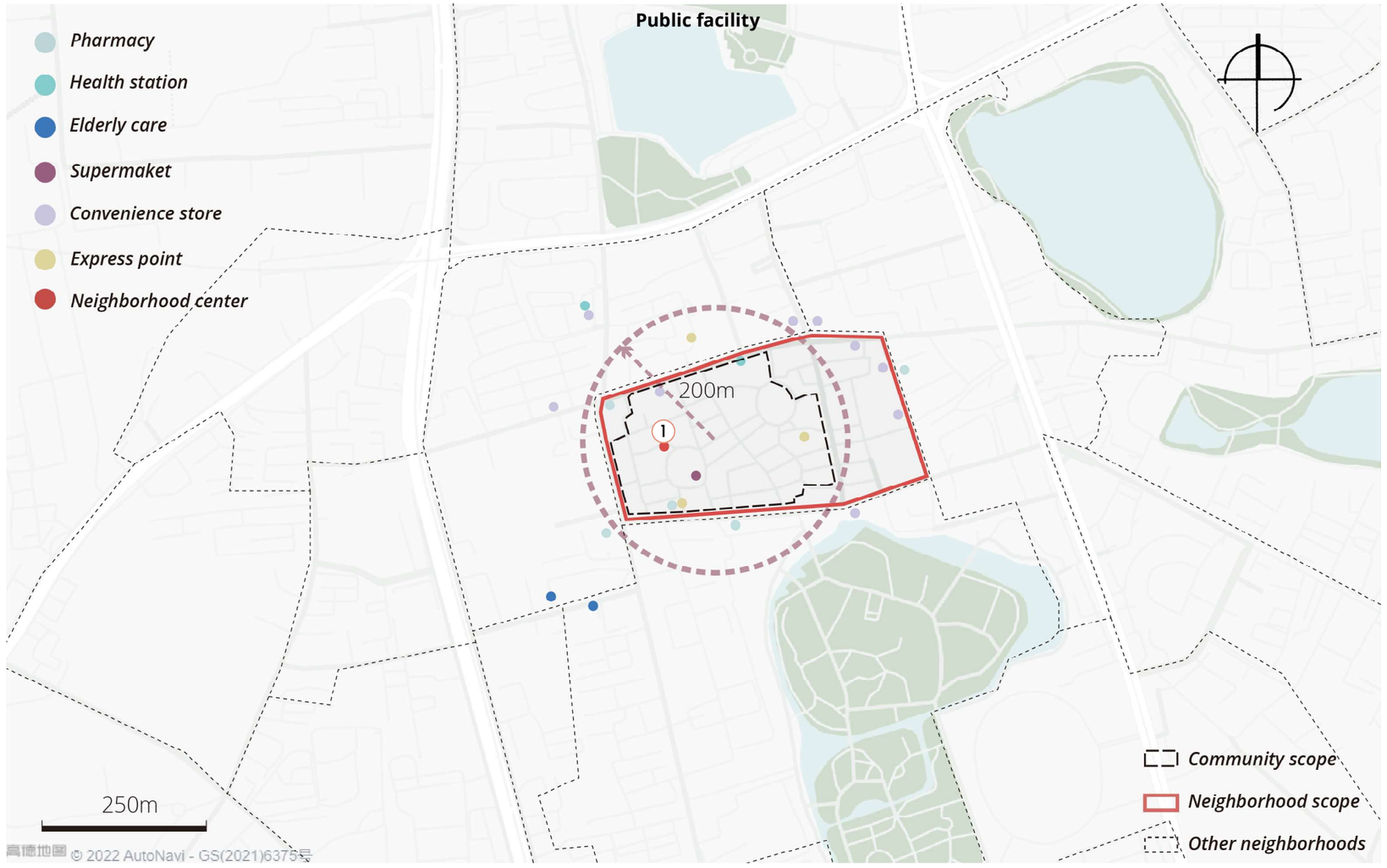
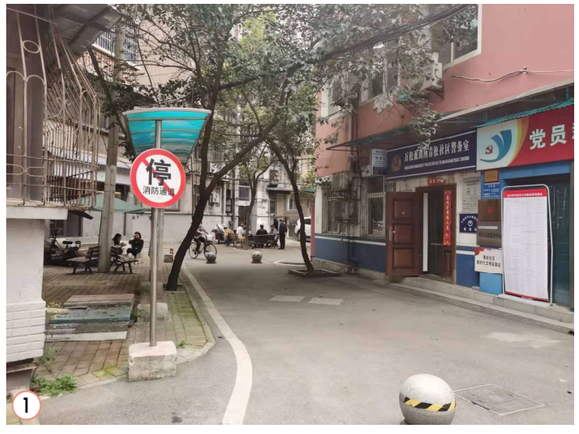


Fig.5.3.2 Neighborhood context analysis
Source: Author, based on AMAP





A low-quality comprehensive center

Inadequate accessible greenery and open space

The strength of the neighborhood context lies in the functional richness of the Qingsong neighborhood, with a high mix of residential, commercial, and office functions. Secondly, it is easily accessible and has a dense road network. Most importantly, there is a good range of public facilities, and they are all positioned within a ten-minute walk of the old community.

The background deficiencies are the high housing density and the lack of adequate systemic greenery and public space. In addition, the neighborhood center is not sufficiently spacious or functional to serve the entire district.

3.2 Community plan——community scale

Fig.5.3.3 The satellite map
Source: Author, based on AMAP

The layout of the whole community is shown on the map. The first and second floors of the residential buildings on the periphery of the community are shops and food restaurants. The northern boundary street of the district is a well-known food street. The main public spaces in the community are the large square in the central part of the community and the square at the southern entrance.

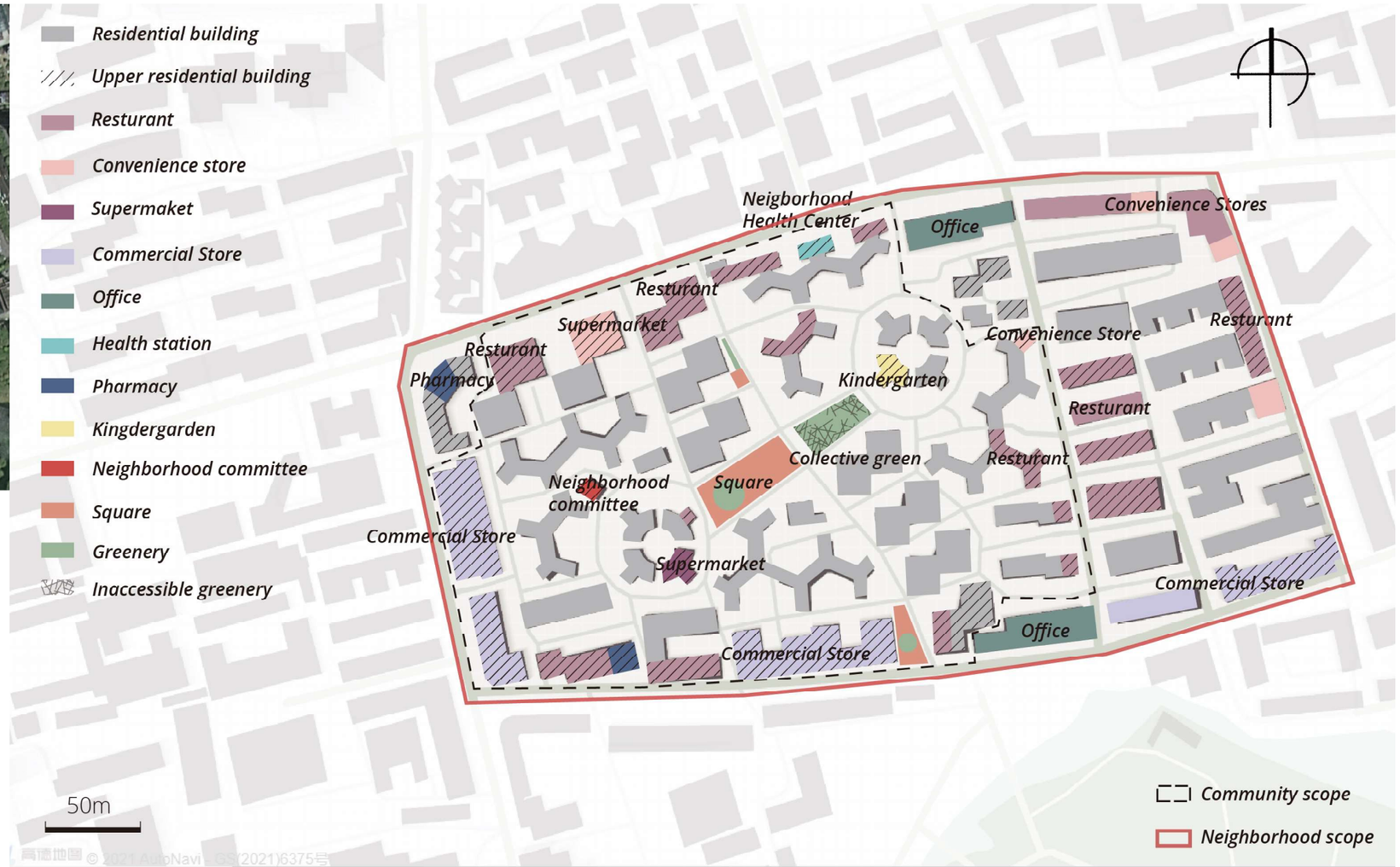


Fig.5.3.4 Community plan
Source: Author, based on AMAP

Inadequate accessible greenery space

Entrance square

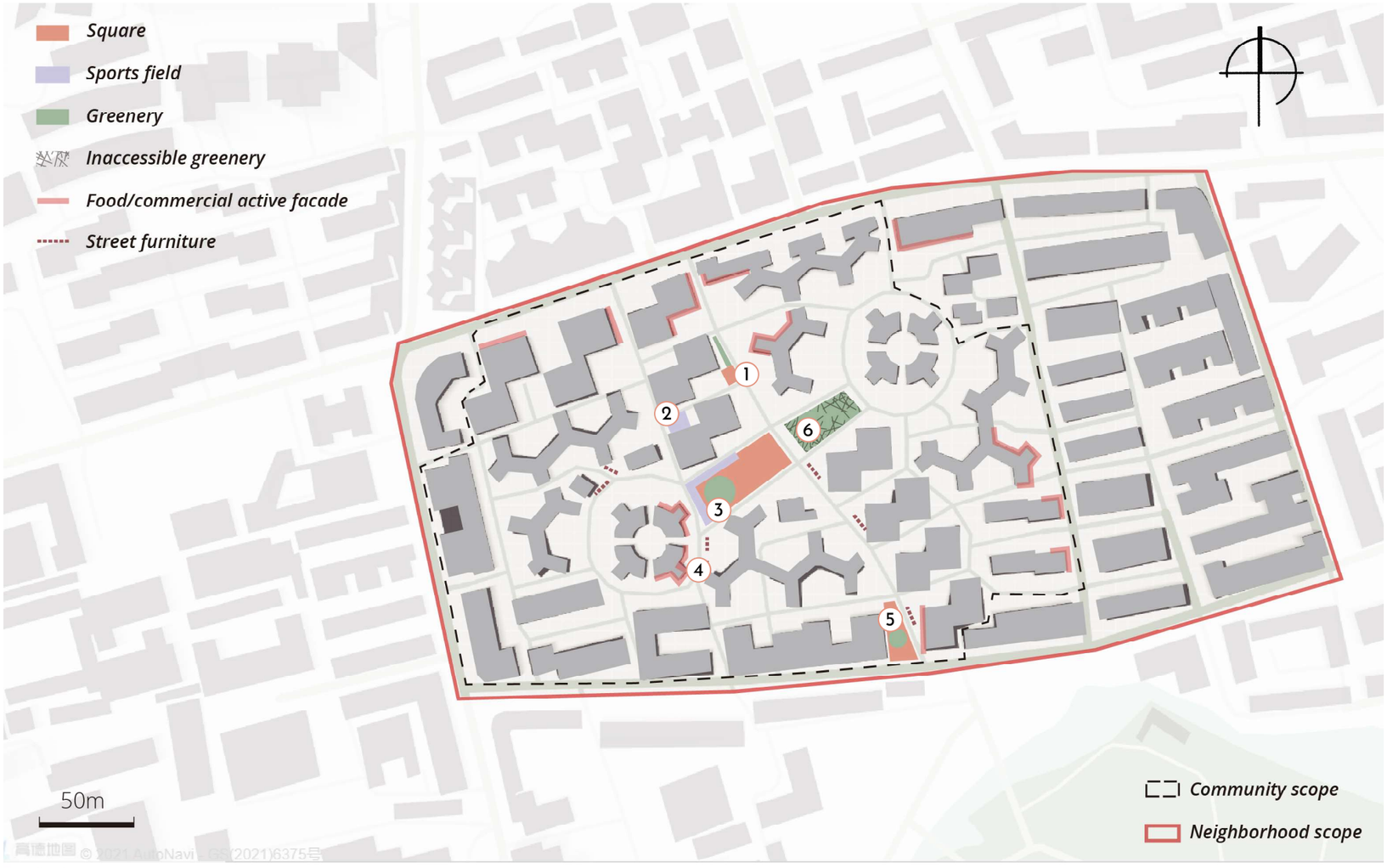
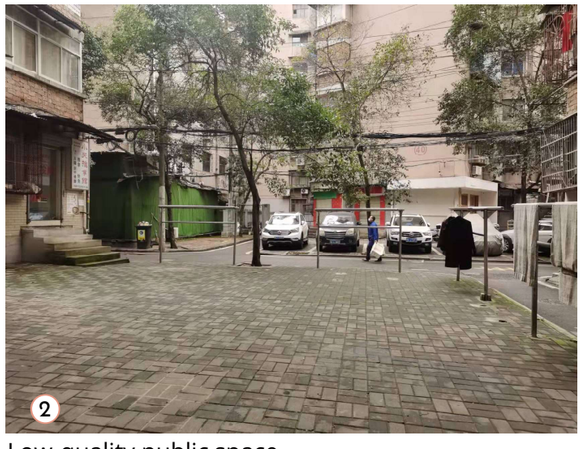


Fig.5.3.5 Public space plan
Source: Author, based on AMAP

Blocked public space



Low-quality public space

The current square is largely occupied by electric vehicles

Deteriorated street furniture and unmet demand for dining

Transportation

Deteriorated street infrasturacture

Insufficient parking

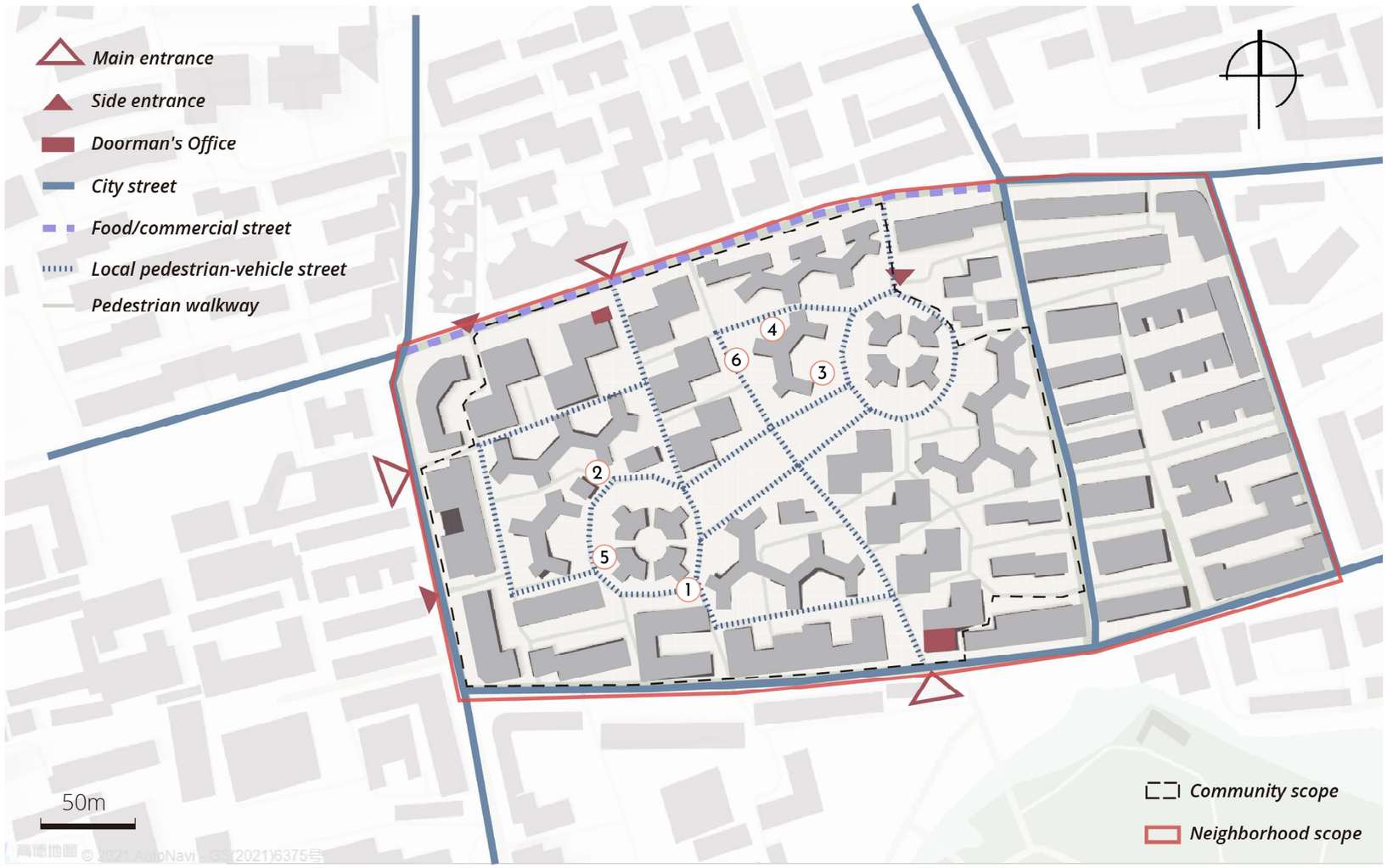


Fig.5.3.6 Transportation plan
Source: Author, based on AMAP

Chaotic mixed pedestrian and vehicular traffic

Blocked sidewalks and insufficient parking

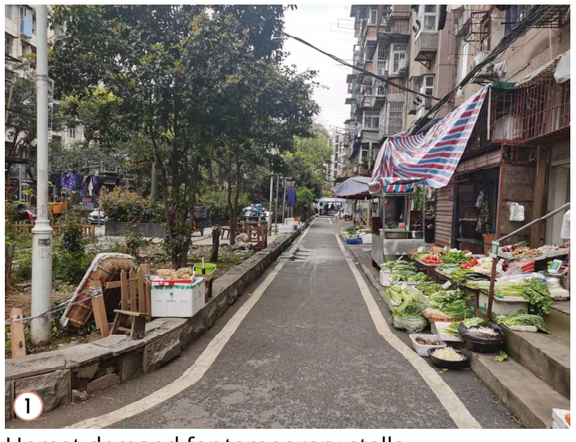
Chaotic and insufficient parking

Deteriorated pedestrian

Activity map & demographic composition

A large proportion of the residents in the community are elderly people and people with low income and low educational levels.

The following photos are of popular locations in the community.



Unmet demand for temporary stalls

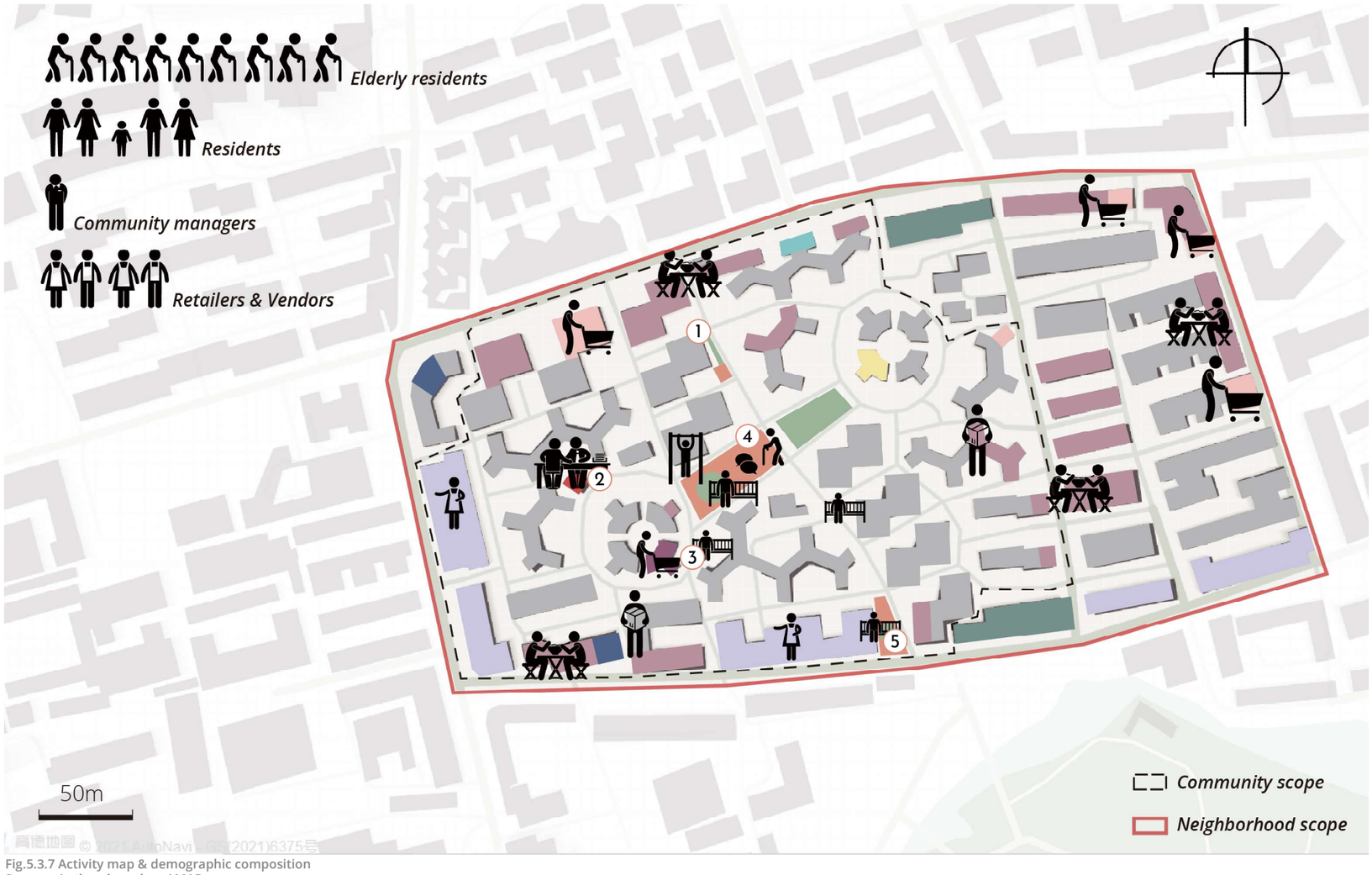
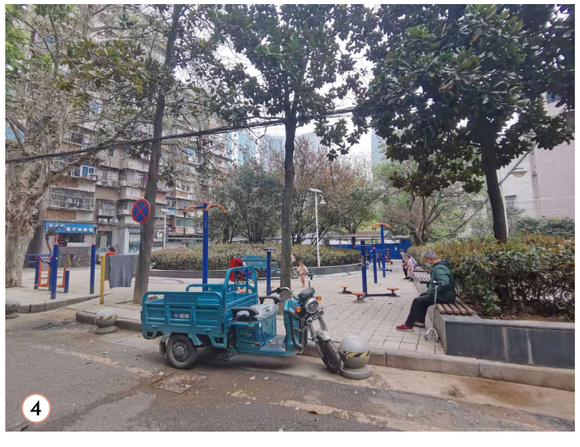


Fig.5.3.7 Activity map & demographic composition
Source: Author, based on AMAP

A comprehensive center that can't evoke a sense of place

Popular supermarket without suitable street infrasture



Unmaintained sports facilities on the central square

Public space that lacks emergency planning

3.3 Community response in the pandemic situation

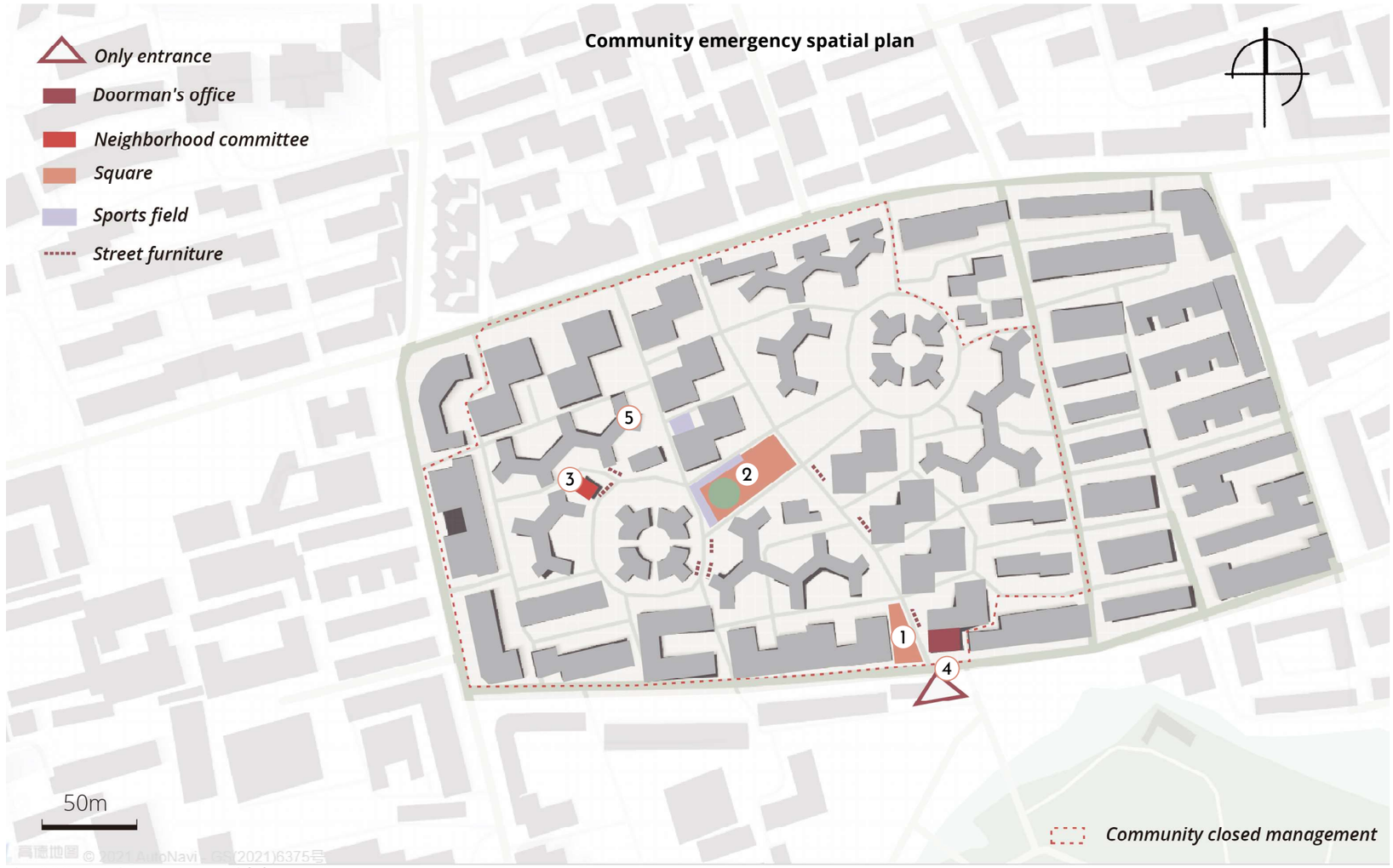


Fig.5.3.8 Community emergency spatial plan
Source: Author, based on AMAP

There were many temporary measures put in place during the close management period responding to the pandemic.

1. There was only one strictly monitored entrance of the community.
2. The central square of the community was used as a place to store goods and for residents to walk around for a certain amount of time.
3. The community center was used as a place for staff to arrange volunteers and pack goods.

Photos in this page are from sources:
https://www.bilibili.com/video/BV1554y1R7WZ?from=search&seid=7889712771176951454&spm_id_from=333.337.0.0&vd_source=e6eafb76b1c8b68aa655b0a5f320ab79; map.baidu.com

3.4 Governance in normal & pandemic situation

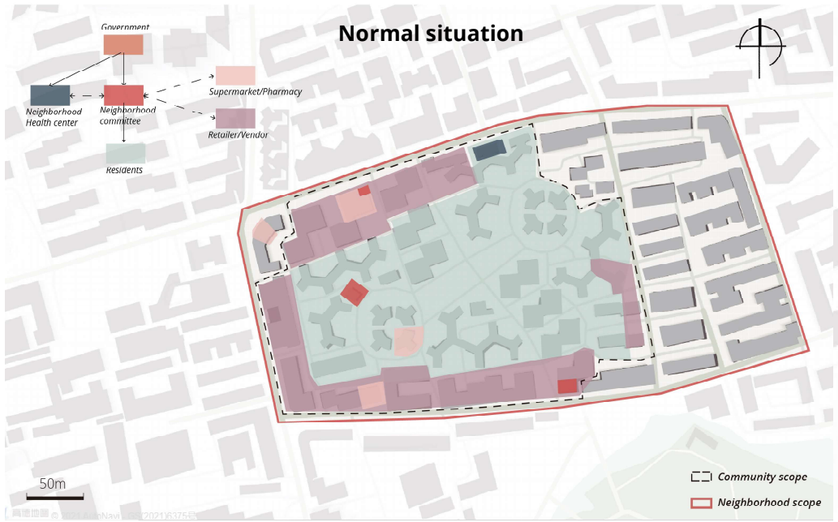


Fig.5.3.9 Governance in the normal situation
Source: Author, based on AMAP

There were many temporary measures regarding emergency governance responding to the pandemic.

(4) Community workers eract temporary shelters at the entrance to check body temperature and temporary passes.

(5) Community workers and volunteers were overworked, not only for disinfection, but also for home delivery and a host of other tasks.

Fig.5.3.10 Governance in the pandemic situation
Source: Author, based on AMAP

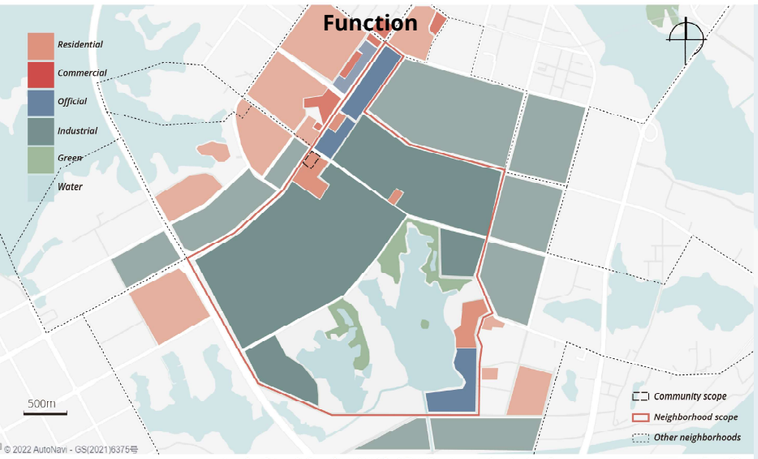
Photos in this page are from source:
https://www.bilibili.com/video/BV1554y1R7WZ?from=search&seid=7889712771176951454&spm_id_from=333.337.0.0&vd_source=e6eafb76b1c8b68aa655b0a5f320ab79

Fig.5.3.1 The bird view of the modern community
Source: https://wuhan.anjuke.com/community/view/996674

2 *Modern Community*

Built age	2019
Households	1542
Floor area	17294 m^2
Building density	high-rise
Maintenance management	regulated
Community infrastructure	well-kept
Community boundary	strictly regulated

Photos in this page are from source: https://wuhan.anjuke.com/community/view/996674



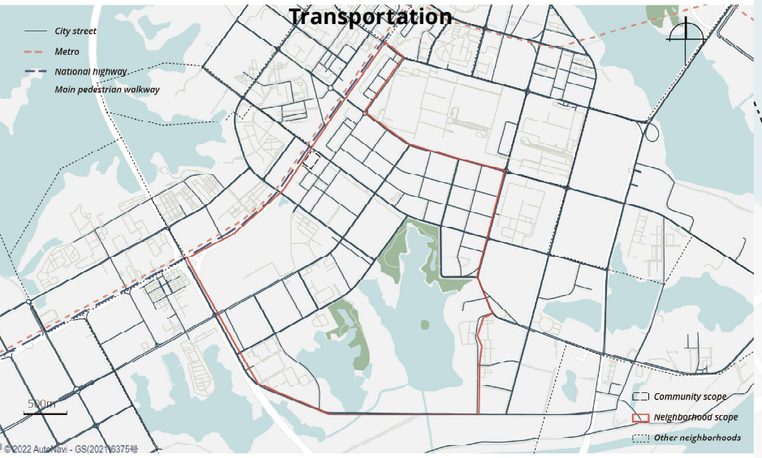


Fig.5.4.2 Neighborhood context analysis
Source: Author, based on AMAP

The strengths of the neighborhood context are the presence of city-level parks and lakes in the Xindu neighborhood and the relatively strong transport links.

The downside is that while the neighborhood has high-quality parks and lakes, it lacks permeable human-scale green open spaces. Secondly, the neighborhood is not sufficiently diverse and is dominated by industrial functions. Finally, the neighborhood center is too far away from the modern community.

4.2 Community plan——community scale

Fig.5.4.3 The satellite map
Source: Author, based on AMAP

The layout of the whole community is shown on the map. The buildings are towers with a compact layout, with shops, restaurants, and property companies on the first two floors, two upper floors for residential space, and one building for a hotel. The main public space in the area is the courtyard square.

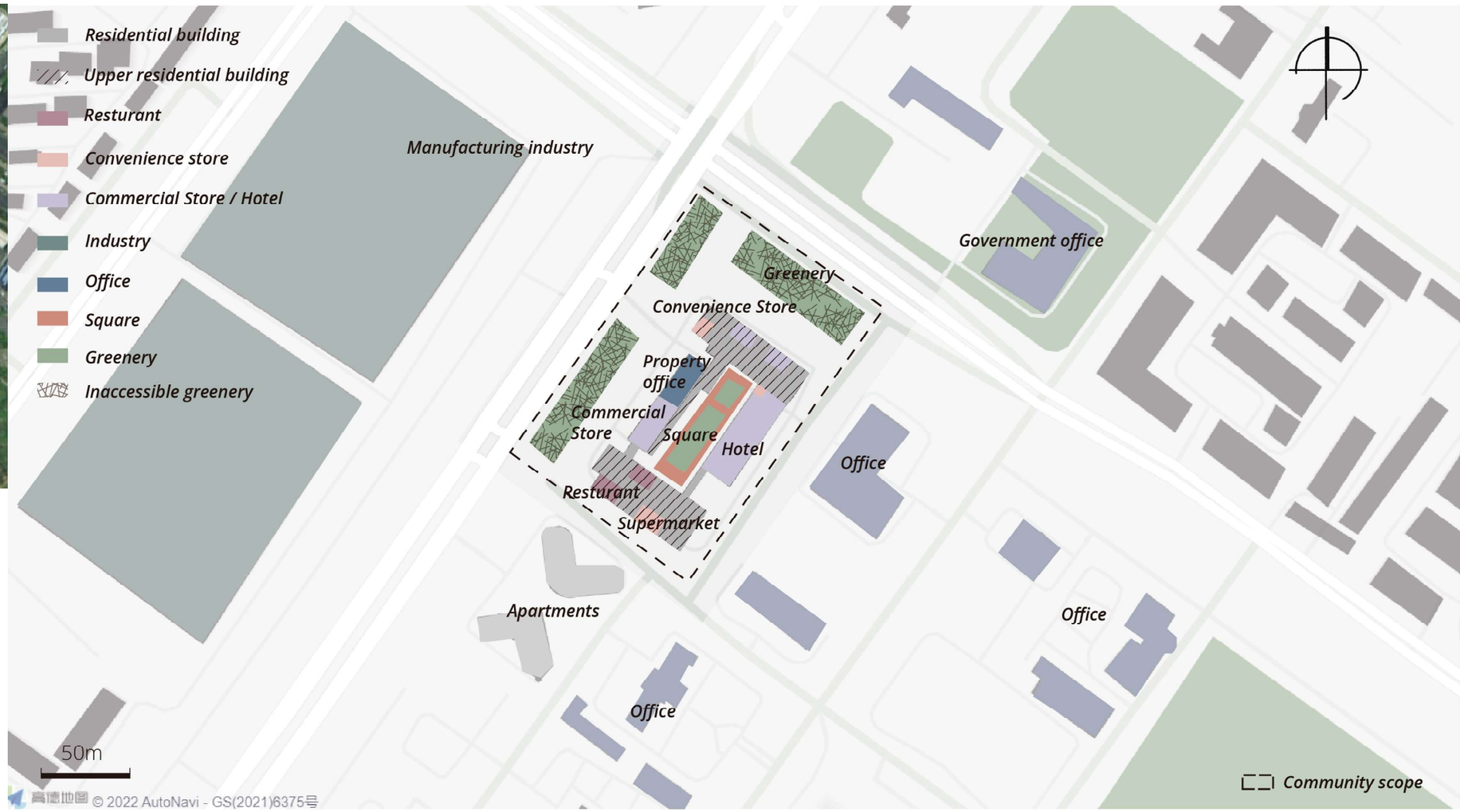


Fig.5.4.4 Community plan
Source: Author, based on AMAP

Public space & transportation

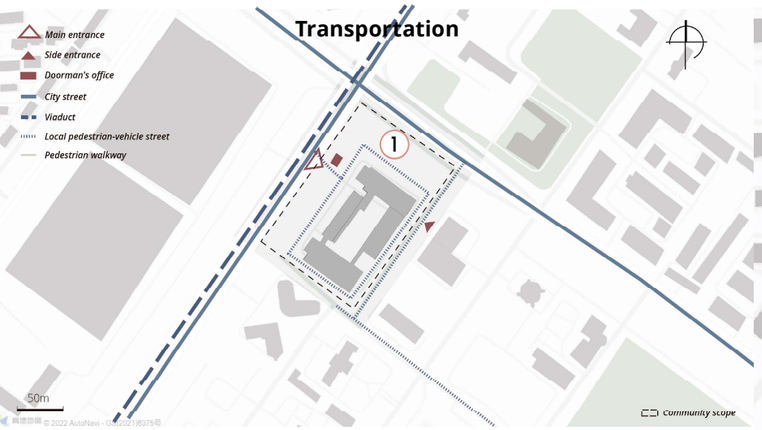
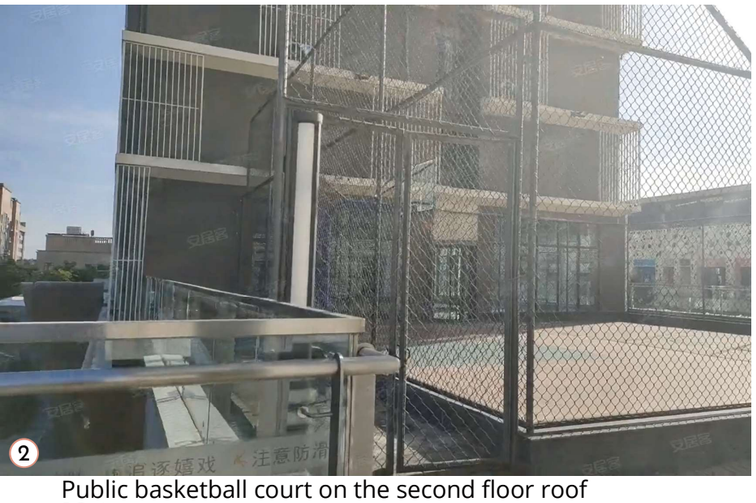


Fig.5.4.6 Transportation plan
Source: Author, based on AMAP

Adequate parking spaces including both ground and underground parking



Public basketball court on the second floor roof

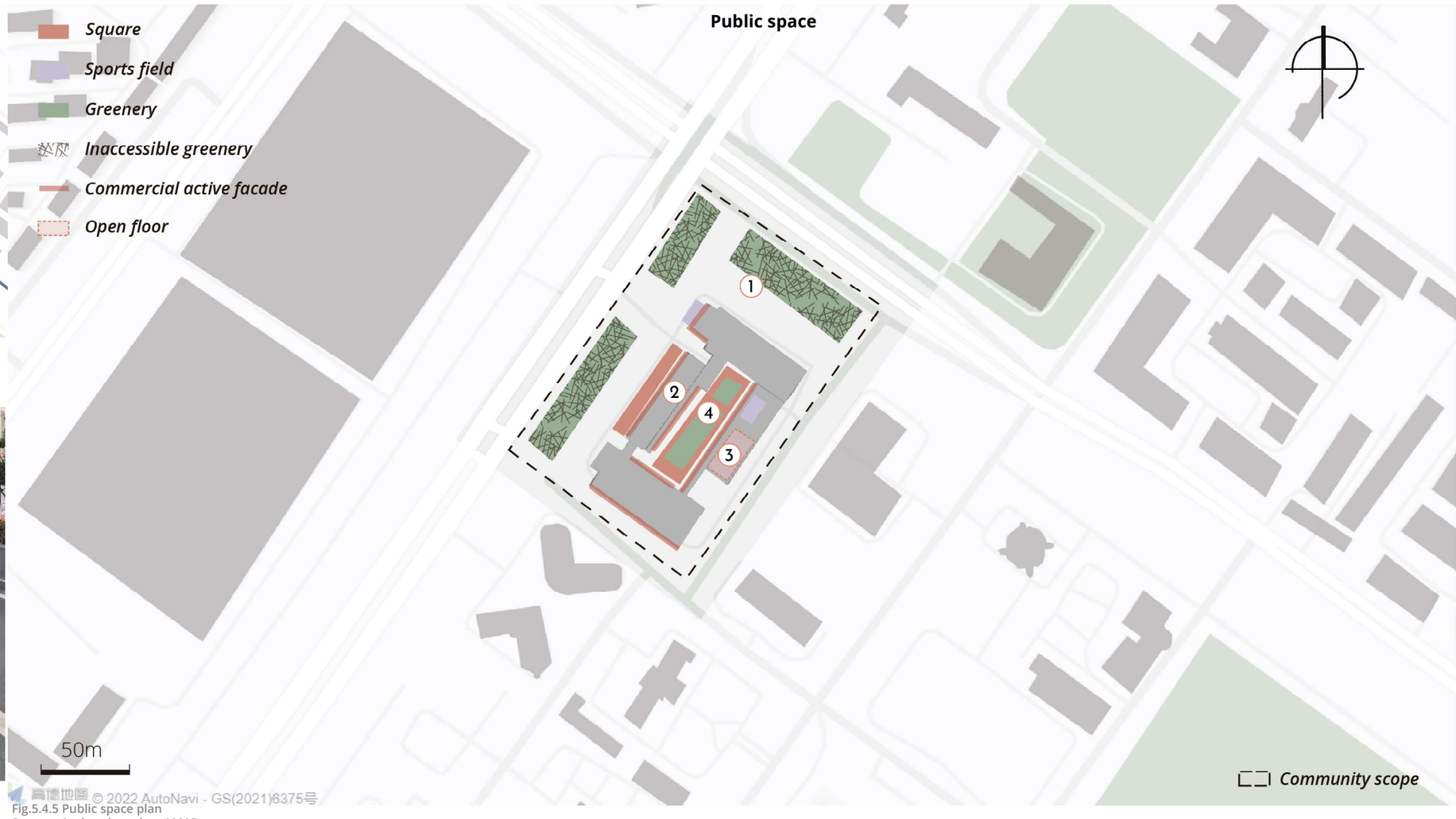


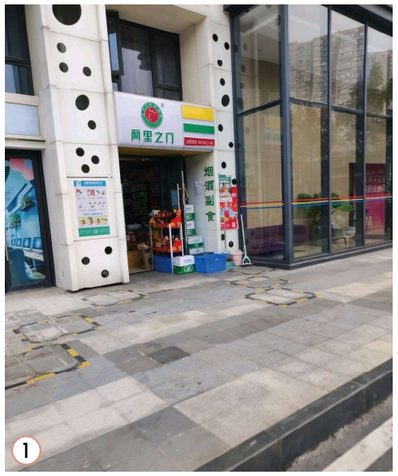
Fig.5.4.5 Public space plan
Source: Author, based on AMAP

Public activity space under the elevated floor

Square in the middle of the courtyard with inaccessible greenery

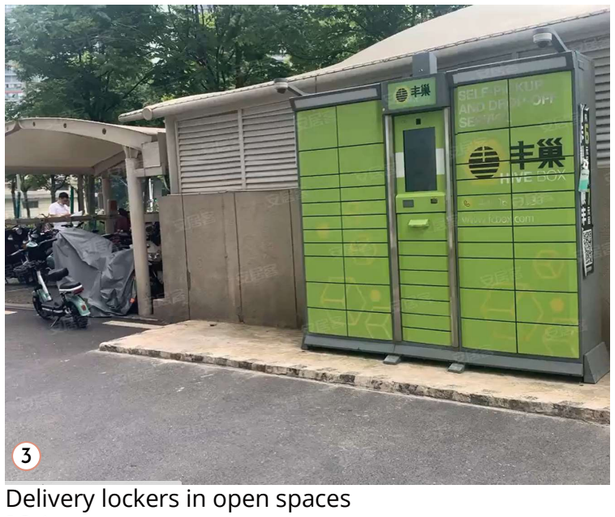
Photos in this page are from source: https://wuhan.anjuke.com/community/view/996674

Activity map & demographic composition



1
A convenience store

2
The property company office



3
Delivery lockers in open spaces

Fig.5.4.7 Activity map & demographic composition
Source: Author, based on AMAP


4
Square in the middle of the courtyard and public sports facilities on the second floor

5
Children's playgrounds

Photos in this page are from sources: https://wuhan.anjuke.com/community/view/996674; map.baidu.com


1


1


2


3

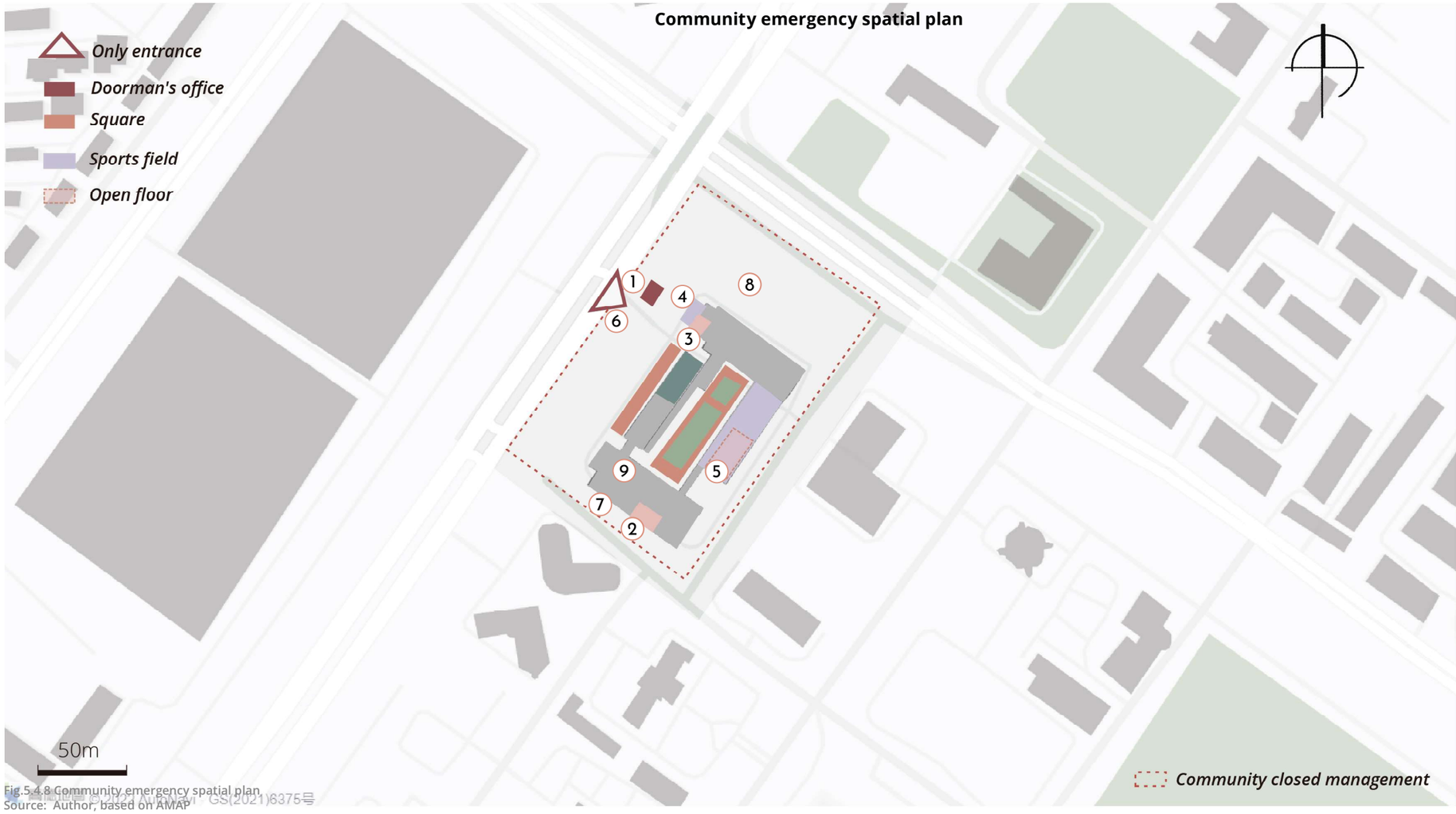


Fig.5.4.8 Community emergency spatial plan
Source: Author, based on AMAP

There were many temporary measures put in place during the close management period responding to the pandemic.

1. Entrances to the community are limited to one and are strictly monitored. A small table is temporarily placed at the entrance for couriers to place their items.

2. The open space next to the flower bed in the area can be used as temporary placement of group purchases.

3. The stock of household goods in convenience stores relieves some of the needs of residents.

4. The open space and the first floor elevated floor of the block are used as nucleic acid monitoring points.

5. The open space and the first floor elevated floor of the block are used as nucleic acid monitoring points.


4


5

Photos in this page are from sources: http://www.dzwww.com/xinwen/guoneixinwen/202108/t20210804_8877848.htm; http://www.dzwww.com/xinwen/guoneixinwen/202108/t20210811_8919656.htm; http://www.dzwww.com/xinwen/guoneixinwen/202108/t20210809_8908881.htm; http://www.dzwww.com/xinwen/guoneixinwen/202108/t20210807_8901069.htm

4.4 Governance in normal & pandemic situation

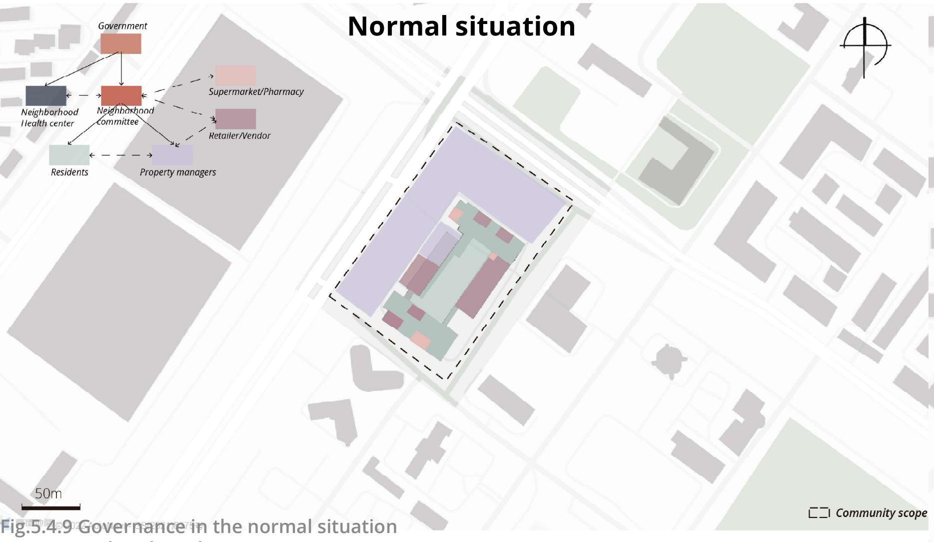


Fig.5.4.9 Governance in the normal situation
Source: Author, based on AMAP

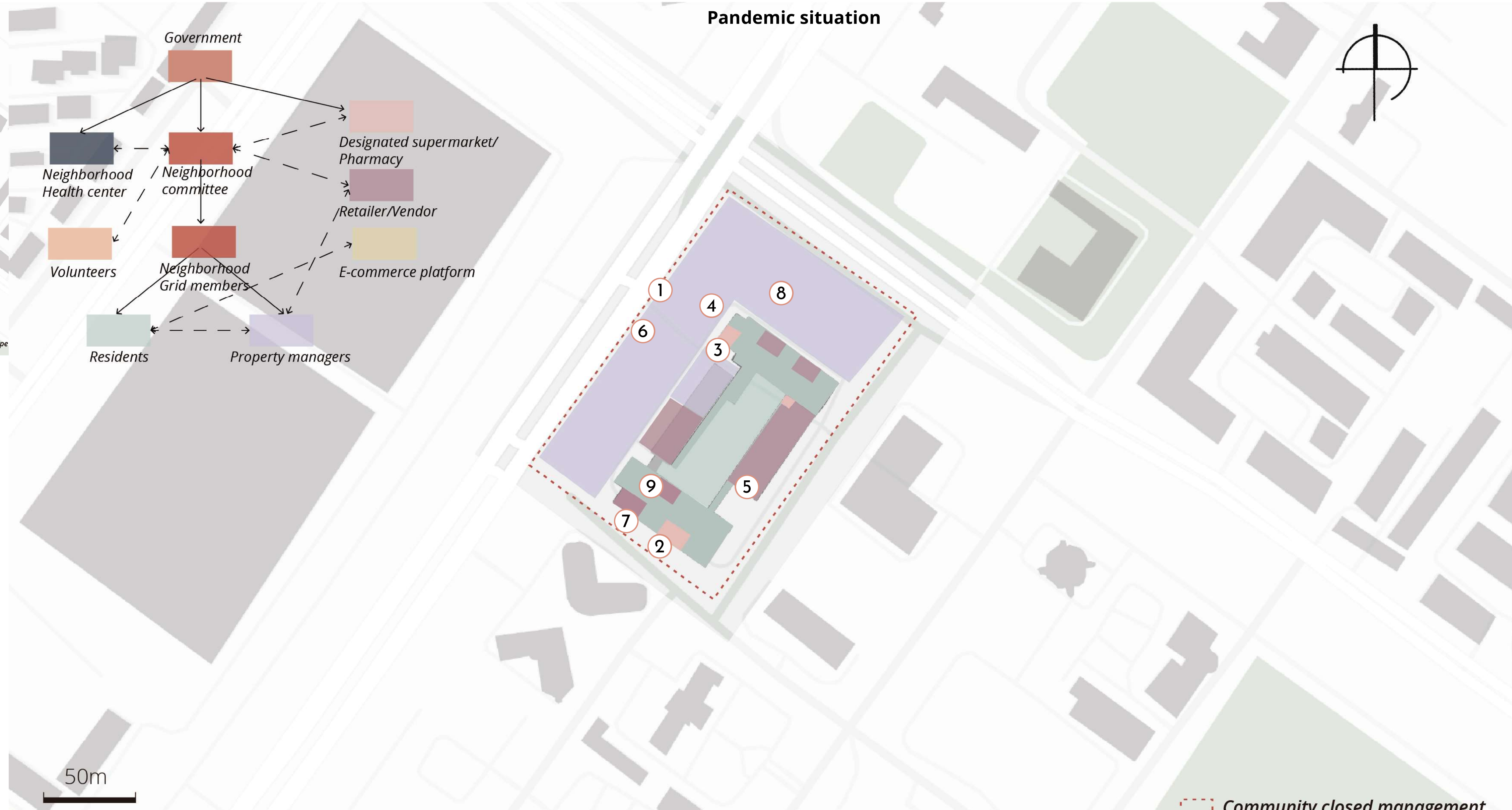


Fig.5.4.10 Governance in the pandemic situation
Source: Author, based on AMAP

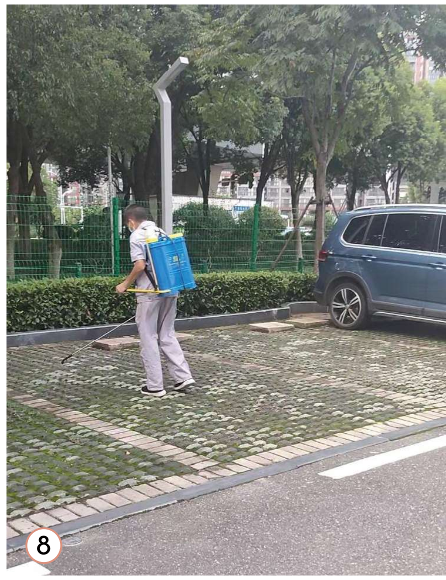
There were many temporary measures regarding emergency governance responding to the pandemic.

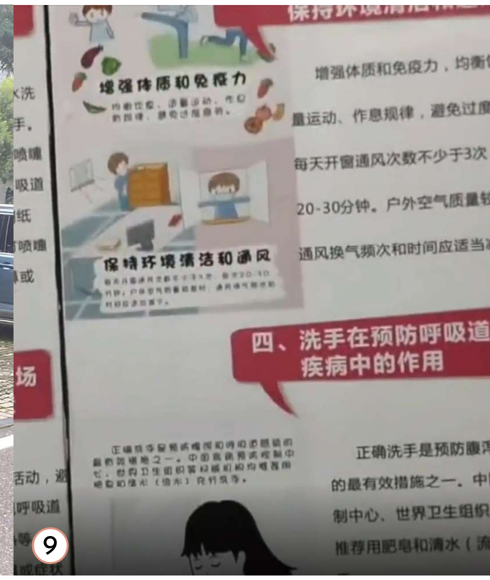
5. Neighborhood committee arranges mobile medical team to help residents in home isolation.

6. Volunteers help supervise the entrance to the community.

7. E-commerce platform helps residents get living materials through group purchase.

8. 9. The property staff are responsible for disinfection work as well as posting notices and health promotion in common areas.





Photos in this page are from sources: http://www.dzwww.com/xinwen/guoneixinwen/202108/t20210804_8877848.htm; http://www.dzwww.com/xinwen/guoneixinwen/202108/t20210811_8919656.htm; http://www.dzwww.com/xinwen/guoneixinwen/202108/t20210809_8908881.htm; http://www.dzwww.com/xinwen/guoneixinwen/202108/t20210807_8901069.htm

5 Summary of community resilience

5.1 Comparision of community resilience

The specific characteristics of the community resilience of the two communities, as measured and compared, are shown in the table below. The radar chart on the right provides a more visual representation of the strengths and weaknesses of the resilience of the two communities.

		Old Community	*Modern Community*
Spatial planning	Neighborhood	Lack of systematic greenery and open space Lack of a good-quality and multi-functional comprehensive center	Lack patches of greenery and open space Public facilities are far away Not enough functional diversity
	Community	Lack of acessible greenery and open space Old buildings and deteriorated infrastracture Blocked sidewalks and insufficient parking Lack of interaction and vitality in public spaces	Lack of accessible greenery and open space Lack of fitness facilities Good-quality but high-density buildings Sufficient parking
Governance	Neighborhood	Lack of diverse public engagement Lack of human resources	Lack of diverse public engagement Professional property management team
	Community	Lack of emergency spatial planning Delayed communication because of lagging technology and low education of residents	Enough open space for emergency planing Timely communication because of property management and ease of Internet use among young residents
Human capital	Neighborhood	Qingsong Neighborhood, consisting of several food streets, whose economy is diverse but not strong	Xindu Neighborhood, consisting of numerous technology companies and industrial parks, whose economy is diverse and vigorous
	Community	Wansong Southern Community A large number of elderly people Low income and low education level High trust among neighbors	Jinsegangwan MIMI Community A large number of young office workers A high portion of mobile population Low frequency of residents' interaction

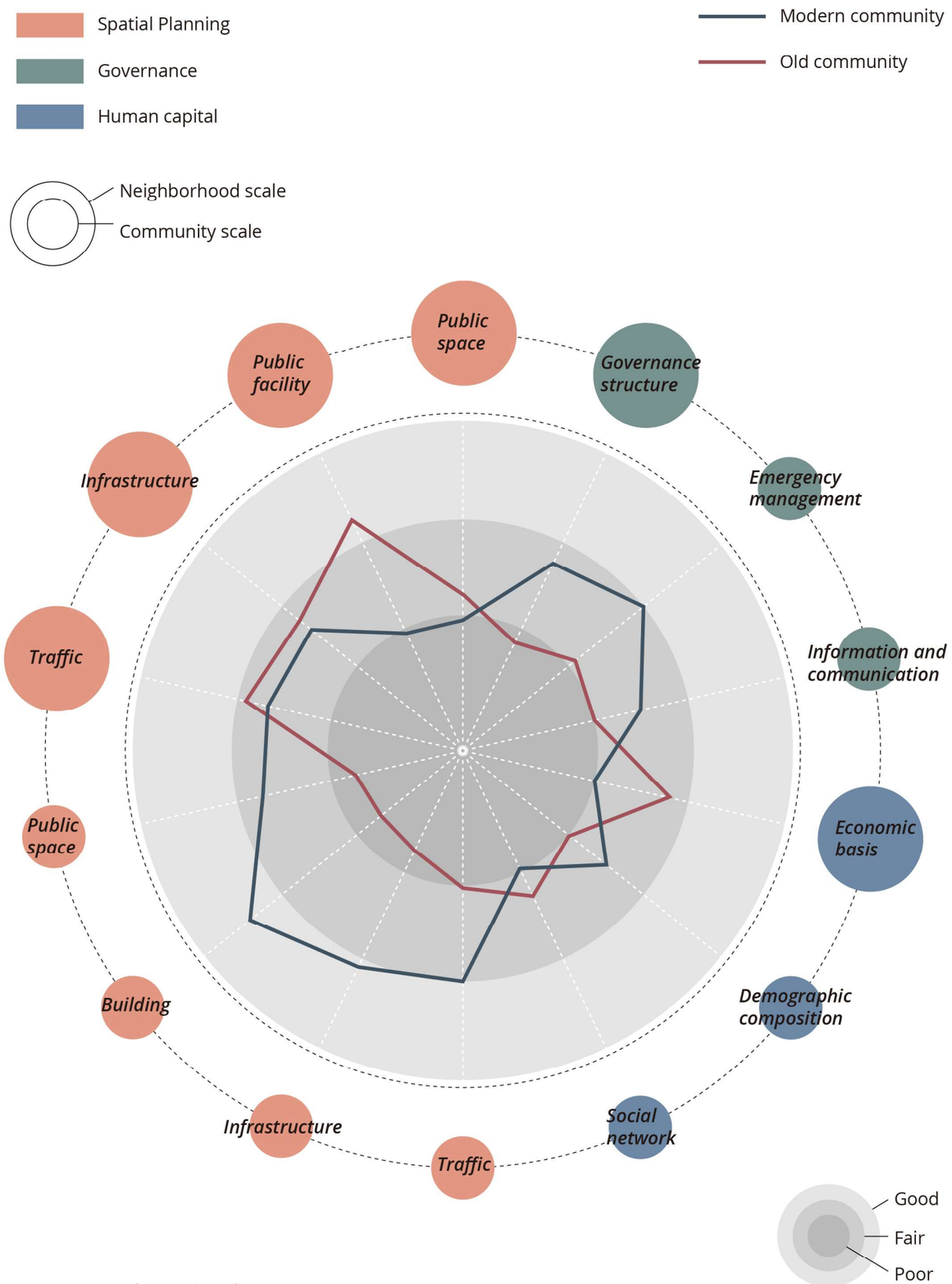


Fig.5.5.1 Comparision of community resilience
Source: Author

5.2 Prominent problems of community resilience

	Old Community	*Modern Community*
Neighborhood	Public space Public facility Governance structure	Public space Public facility Economic basis
Community	Public space Building Infrastructure Traffic Emergency management Information and communication Demographic composition Social network	Public space Building Social network

In general, the modern community scores higher in terms of community resilience than the old community.

Firstly, in terms of spatial planning and governance, the modern community is better than the old one. This is because the modern community has been newly built in recent years, and the spatial environment and governance institutions of the community are better than those of the aged community. While the modern community is in new economic development areas resulting in a lack of resilience at their neighborhood scale, the older community is in downtown areas where resilience at their neighborhood scale has an advantage. However, community resilience is more relevant to people's daily lives, so smaller scales are more dominant.

Secondly, in terms of human capital, both communities need to improve their resilience. Residents in the modern one are young and highly educated, but have low social ties due to low communication. Residents in the old one have harmonious social relationships, but low levels of literacy and low incomes lead to a low capacity to cope with crises.

By comparing the resilience scores, the problems that stand out in the resilience of the two communities are summarized in the table above. Compared to the modern areas, the older areas have lower resilience scores, more problems, and more serious issues that need to be addressed as soon as possible. Older communities were therefore chosen as the case study for the subsequent exploration of community resilience strategies.

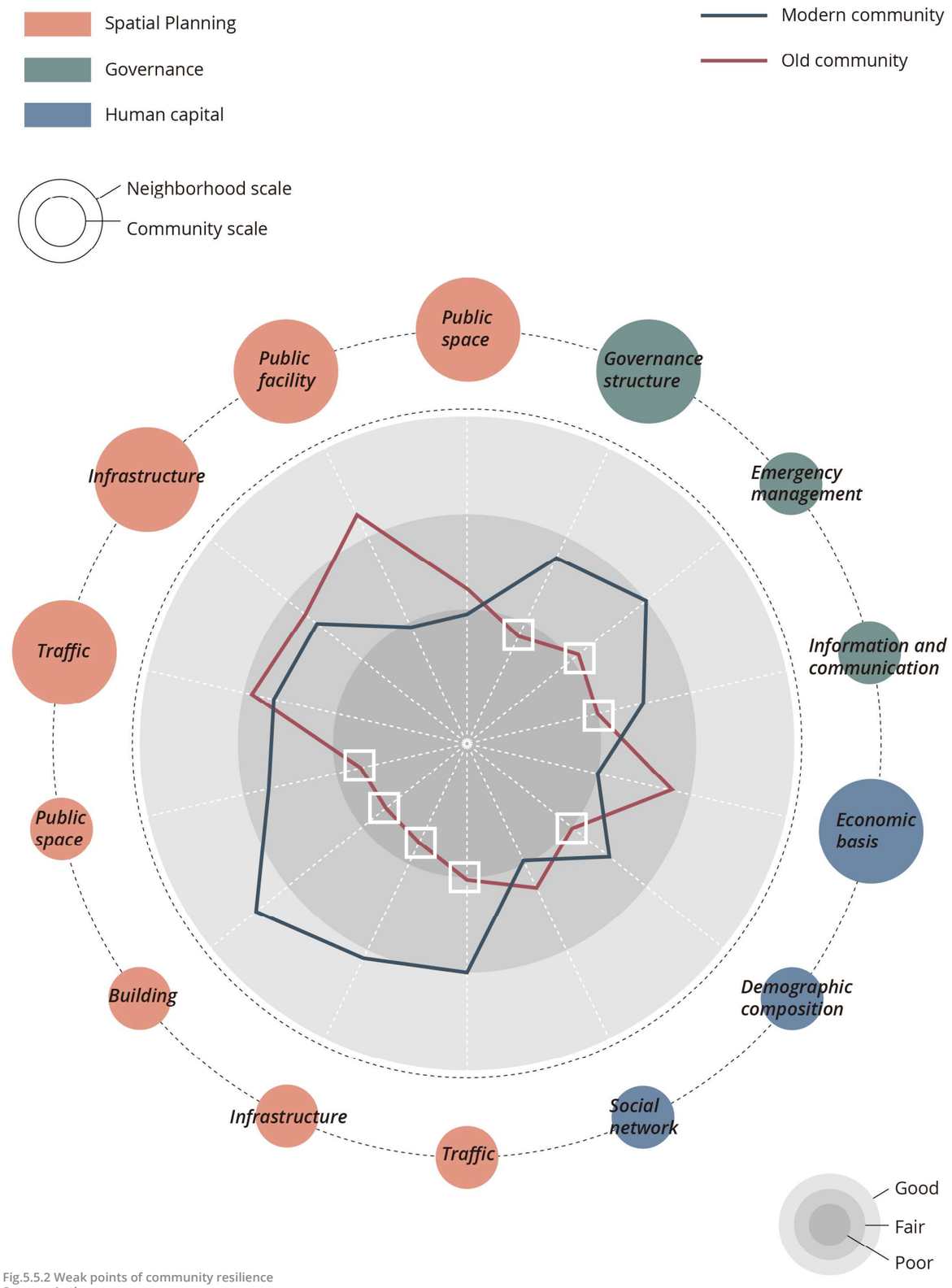
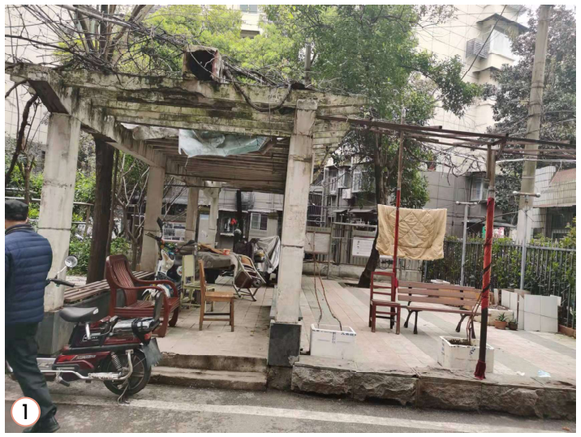


Fig.5.5.2 Weak points of community resilience
Source: Author

6 Case selection: the old community

6.1 Sptatial problem map——community scale



Blocked public space

Deteriorated street infrasturacture

Old and low-quality residential building

Low-quality public space

Blocked sidewalks and insufficient parking

Chaotic parking

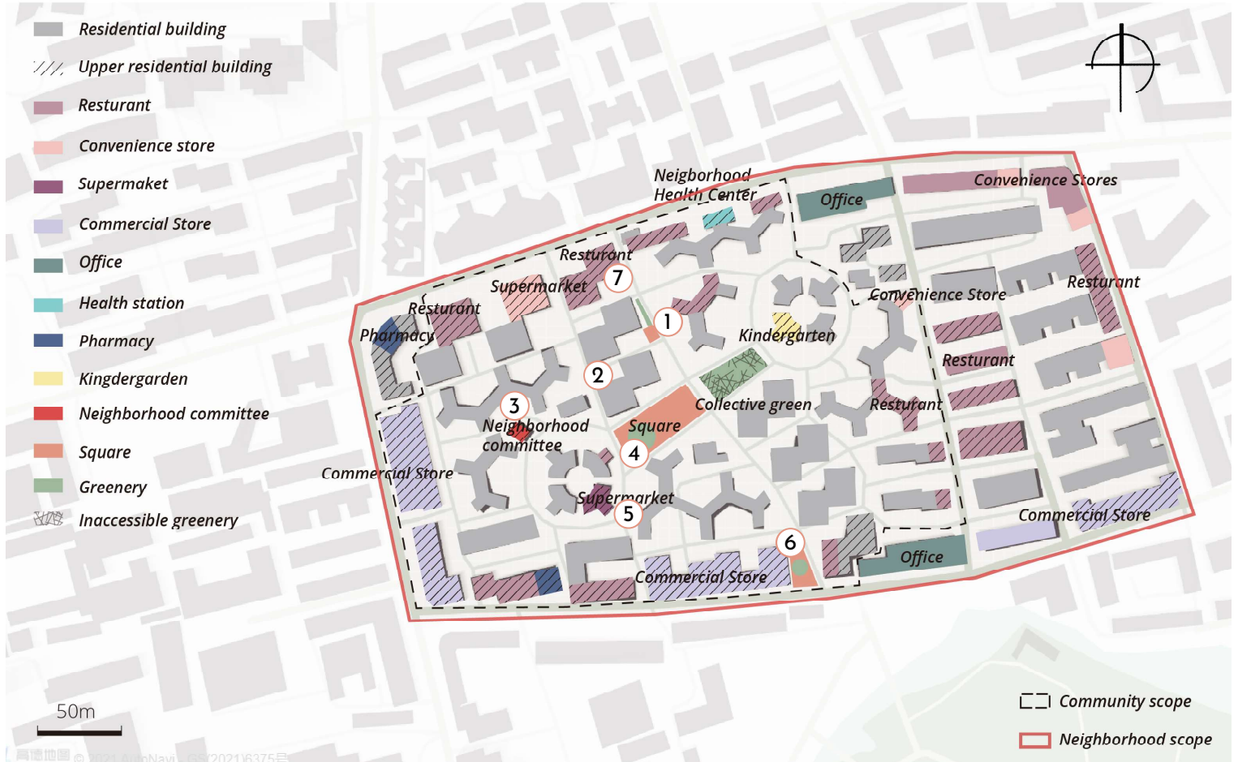


Fig.5.5.3 Sptatial problem map
Source: Author, based on AMAP

Reviewing the previous spatial planning analysis, the following are the main areas of low resilience in the old community.

The resilience issues are more apparent at the local scale. The first is that there is very little human-scale, accessible green space and open space. The second is that public spaces are occupied by clutter. Then there are the aged public facilities and street infrastructure, which lack maintenance. This is closely followed by spaces that fail to boost resident interaction and lack vibrancy. Finally, the overall public space planning of the district is disorganized and there is a lack of emergency planning.

At the neighborhood scale, the community has neither a functional and service-rich node nor a continuous system of green and open spaces.

6.1 Sptatial problem map——community scale

The current square is fragmented due to unmaintained greenery and decayed sports facilities

The current square is largely occupied by electric vehicles

The inactive square two years ago

Source: map.baidu.com

The empty square two years ago

Source: map.baidu.com

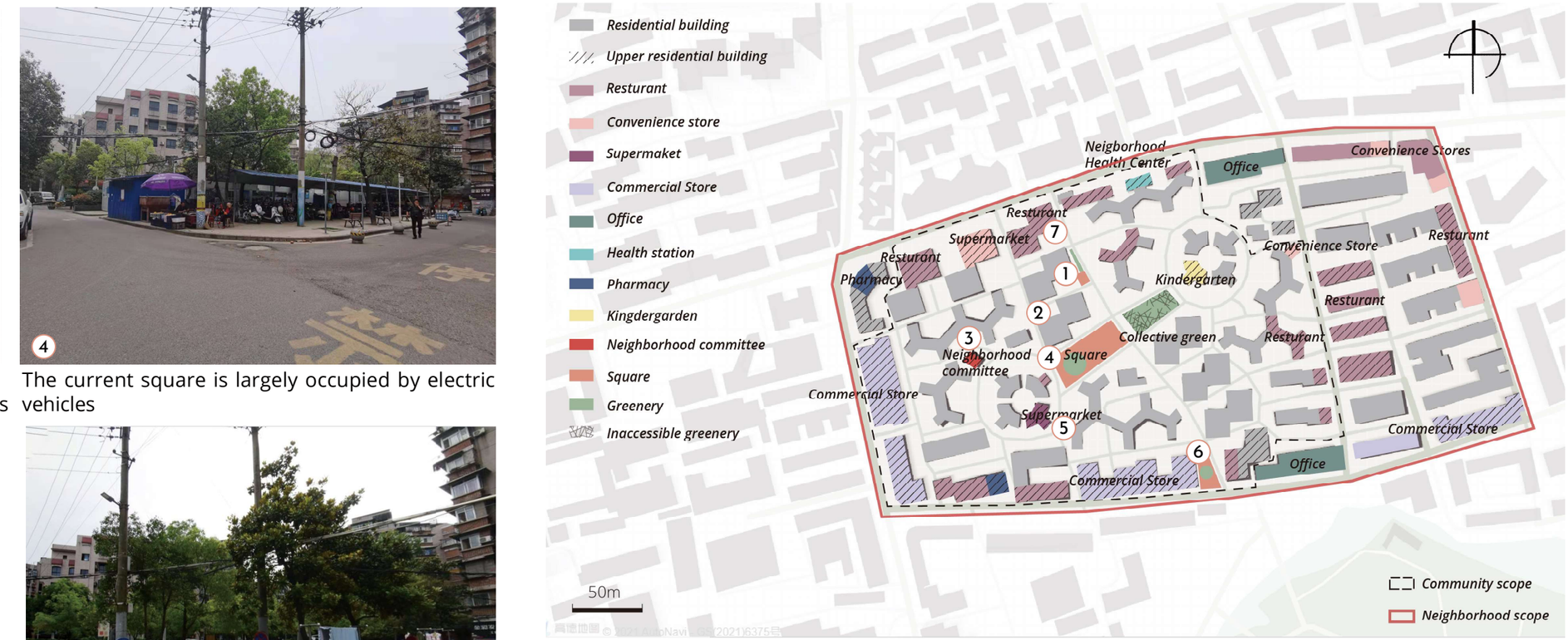


Fig.5.5.3 Sptatial problem map
Source: Author, based on AMAP

Deteriorated street furniture and unmet demand for dining

Poor pedestrian infrastructure

Public space that lacks emergency planning

Unmet demand for temporary stalls

6.2 Sptatial problem map——neighborhood scale

A low-quality comprehensive center

A comprehensive center that can't evoke a sense of place

Source: map.baidu.com

Unpleasant walking experience around the comprehensive center

Chaotic surroundings of the comprehensive center

Inadequate accessible greenery space

Inadequate accessible open space

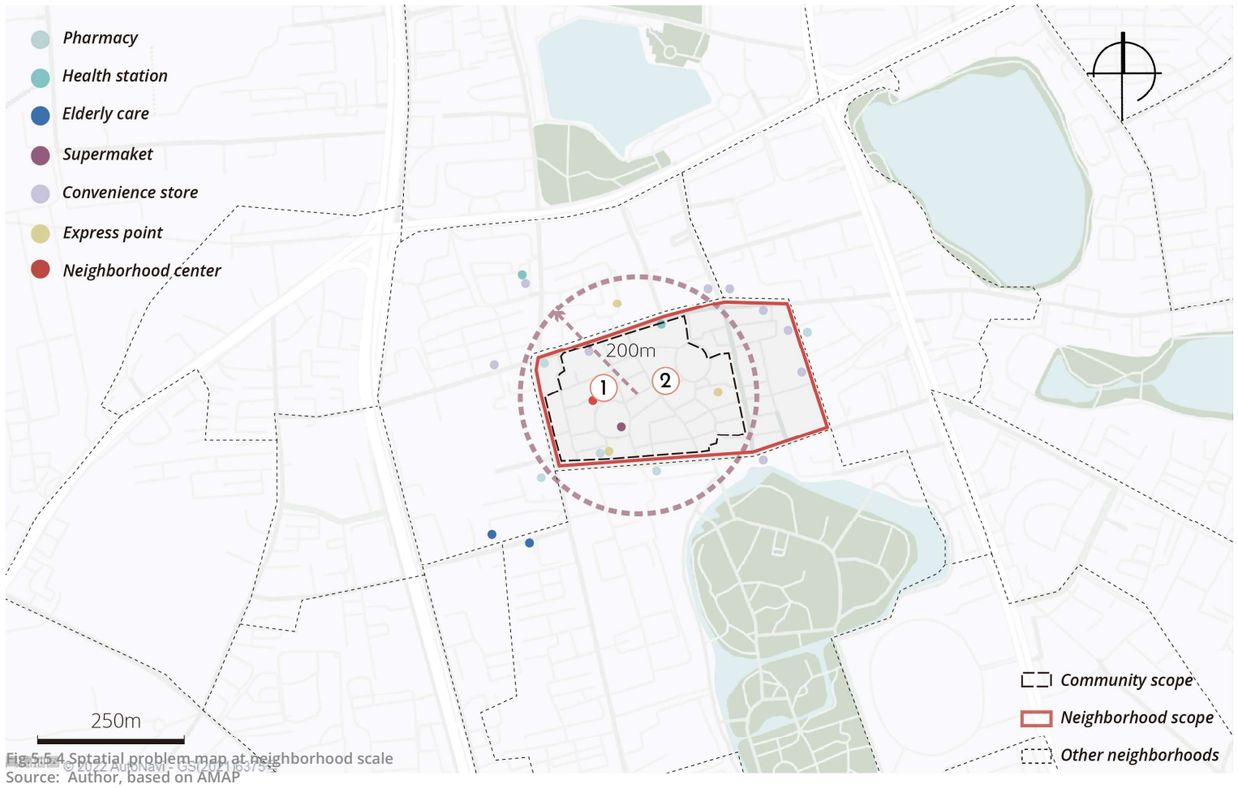


Fig.5.5.4 Sptatial problem map at neighborhood scale
Source: Author, based on AMAP

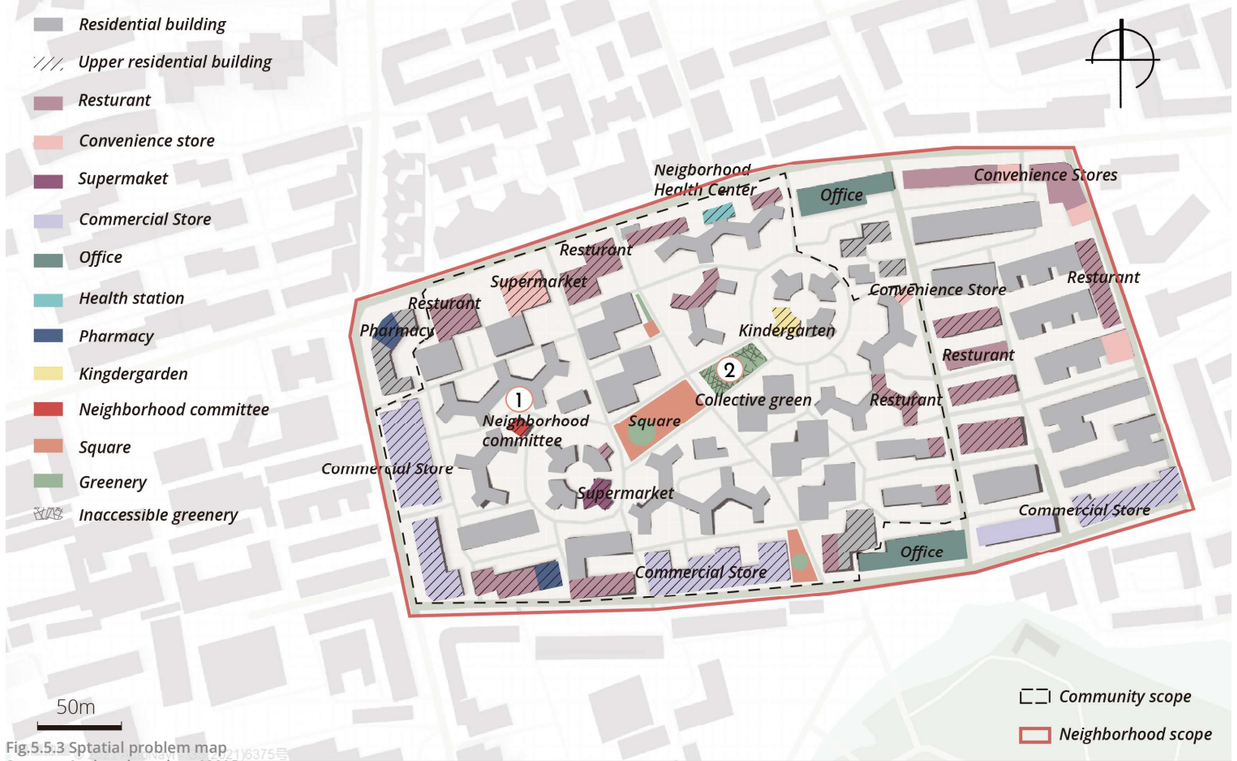


Fig.5.5.3 Sptatial problem map
Source: Author, based on AMAP

06 VISION & STRATEGY

1 A liveable and smart future
2 Principles for vision
3 Strategy toolkit
4 Strategic frameworks
5 Location-based schematic frameworks

Wuhan old community transformation is regarded as a key work to promote people's livelihood.
Source: https://m.gmw.cn/baijia/2021-09/02/1302530105.html

Vision:
a liveable and smart future where the community is well prepared, enabling people to adapt quickly and lead normal lives if a crisis happens

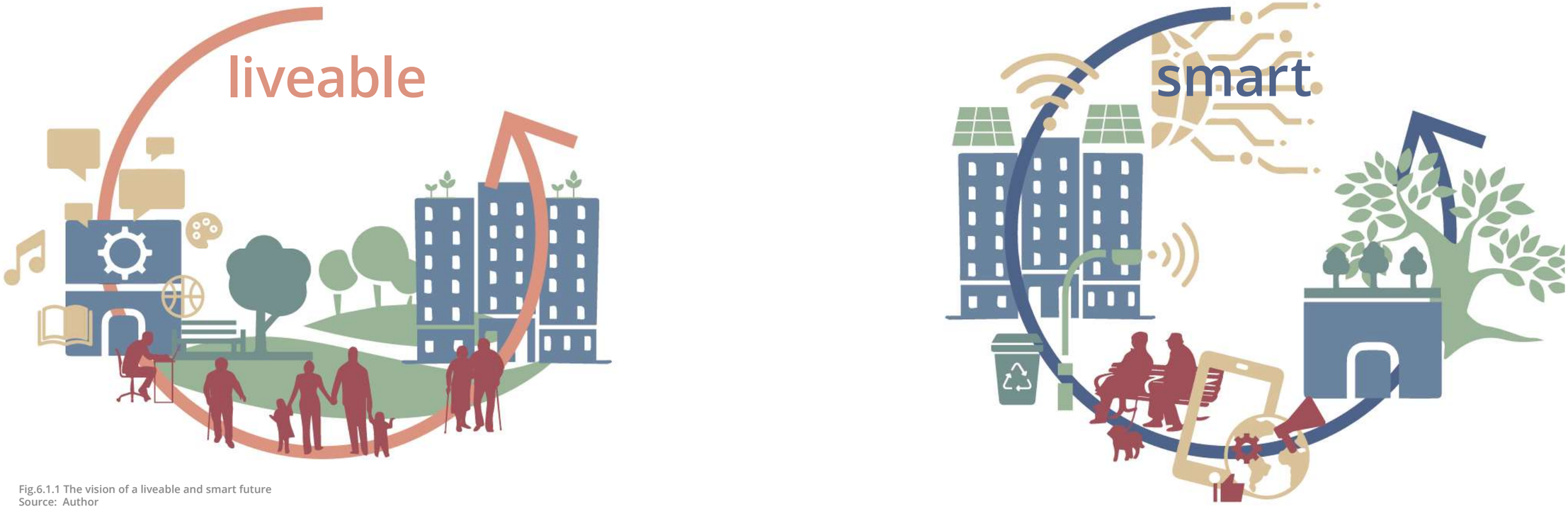


Fig.6.1.1 The vision of a liveable and smart future
Source: Author

Based on the previous context analysis and lessons learned from global references, A Liveable and Smart Future Vision is formulated that states the goals and pathways for strengthening community resilience in Wuhan.

Two pillars are outlined in alignment with the vision, namely:
1. Liveable: The community meets the changing needs of residents in different periods, ensuring their higher standards of living.
2. Smart: Innovative digital technology aids community function and benefits every member in the community, in both daily life and emergent situations.

2 Principles for vision

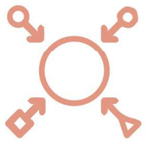
The specific principles corresponding to these two pillars are listed below, in order to guide and create strategies.

liveable

Community meets the changing needs of residents in different periods, ensuring their higher standards of living.

Human-orientation

Meet the needs of different groups
Focus on the changing needs of different periods
Human scale design



Inclusion

Encourage the public engagement
Support all community groups

Ecologization

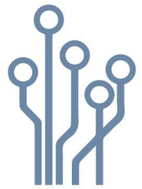
Design multi-functional open green space
Design for both human and ecosystem

smart

Innovative digital technology aids community function and benefits every member in the community, in both daily life and emergent situations.

Innovation

Adopt advanced technology
Enhance links between virtual services and real space
Combine online and offline services



Intelligence

Encourage standardization
Customize to local context

Green transition

Promote green building and energy
Advocate sustainable lifestyle

3 Strategy toolkit

Based on Wuhan context and cases from other countries (see Appendix 1) , four main types of strategies structure the toolkit for improving community resilience.

Following the principles for vision, more categories of strategies are made to offer more detailed intervention. Classification of spatial and non-spatial strategies for ease of implementation.

The strategy toolkit put up with the following categories:
1. Temporary planning: emergency spatial planning, technology application, cooperation of actors
2. Urban renewal: multi-use public space, accessible open and green space, renovated building, prioritized soft mobility, climate-resilient utility
3. Digital transition: smart infrastructure, augmented interesting experience, energy transition, offer online service for off-line, digital inclusive access, digital literacy
4. Public engagement: timely communication, economical and social support for vulnerable groups, inclusive education, multi-sectors' engagement, foster a sense of belonging

Each tool block is equipped with:
1. Tool name and tool number as an identification code
2. Spatial unit and scale of intervention
3. Representative examples

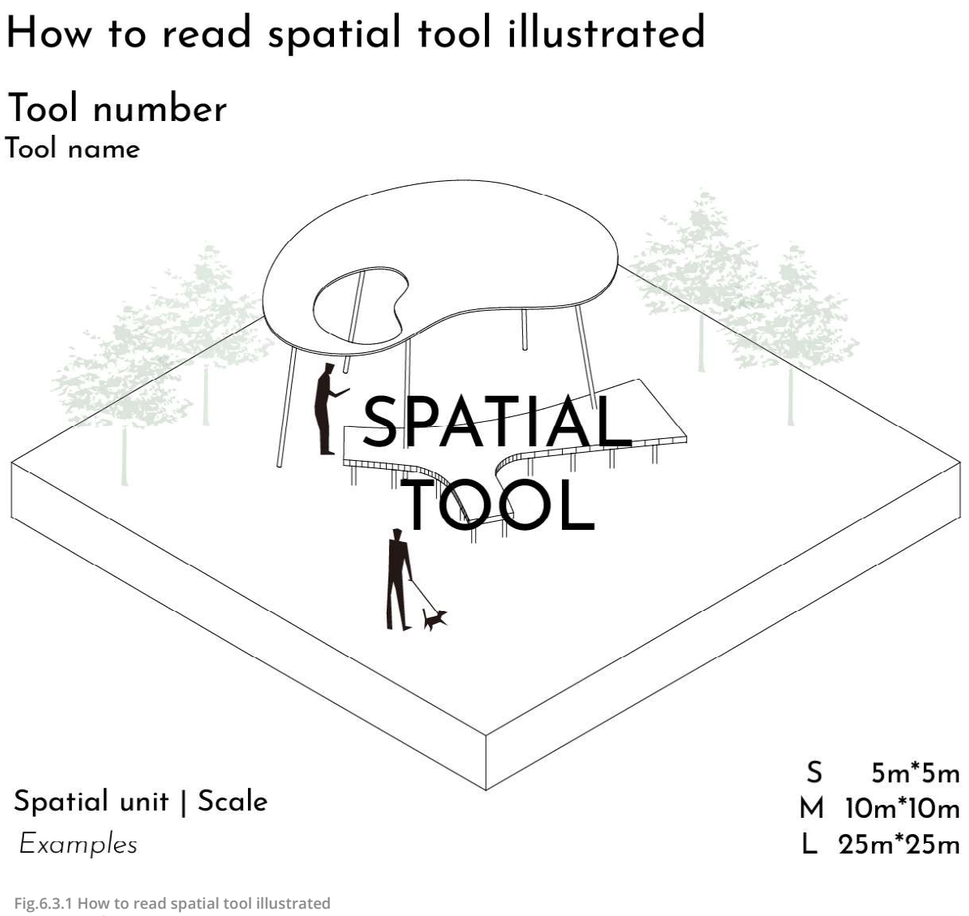
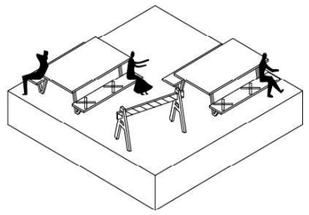


Fig.6.3.1 How to read spatial tool illustrated
Source: Author

SPATIAL

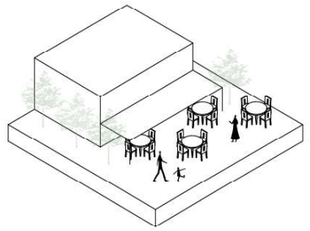
Emergency spatial planning

TP-E1
Signage



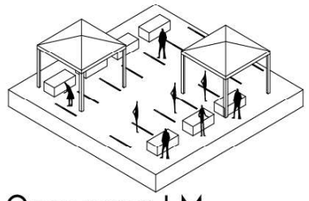
Open space | S

TP-E2
Adaptable public space



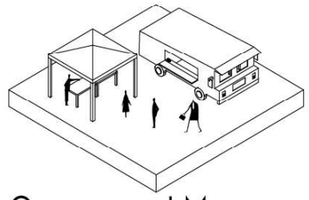
Open space | M
eg. Open-air dining

TP-E3
Pop-ups



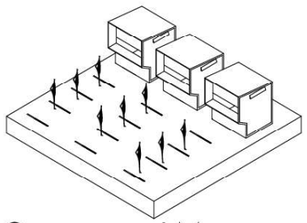
Open space | M
eg. Food market,
Delivery zone

TP-E4
Mobile device



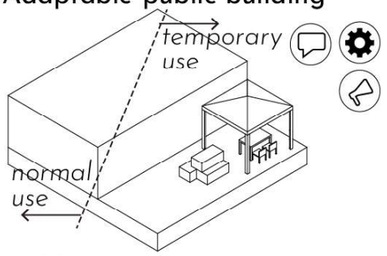
Open space | M

TP-E5
Module construction



Open space | M
eg. Rapid test

TP-E6
Adaptable public building



Building | M

Temporary planning

Temporary planning interlinks strategies of rapid response to unexpected situations. It is a collection of short-term strategies.

The primary aspects here include emergency spatial planning, technology application, and cooperation of actors.

In a general context, the tools are taken to improve community capacities to plan and respond to risks.

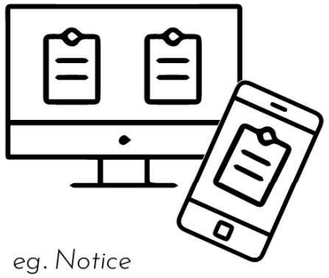
NON-SPATIAL

Technology application

TP-T1
Contact tracing

eg. Footprint, Identification

TP-T2
Information sharing



eg. Notice

TP-T3
Monitoring

eg. Gatekeeping

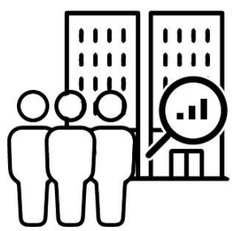
TP-T4
Telemedicine

NON-SPATIAL

Cooperation of actors

TP-C1
Moblie medical Team

TP-C2
Supervisory team

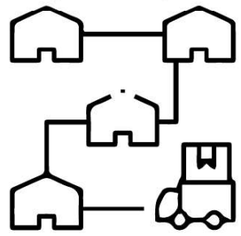


TP-C3
Volunteer

TP-C4
Business cooperation

eg. Food vendors, Convenience store owners, Restaurant owners, Pharmacy owners

TP-C5
Enterprise cooperation

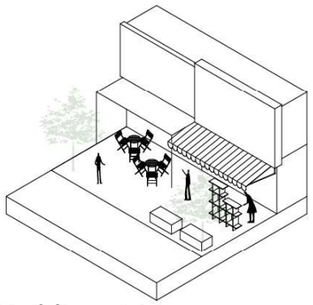


eg. Supermarkets, E-commerce platforms, Courier companies

SPATIAL

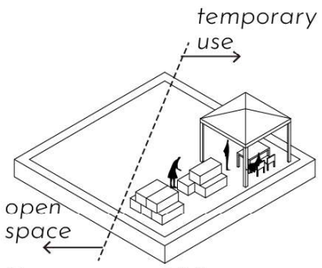
Multi-use public space

UR-M1
Public frontage activation



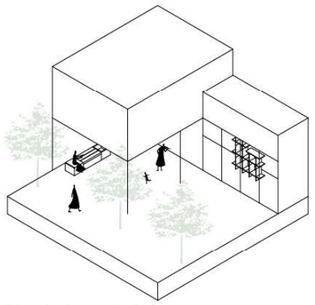
Buildings | M

UR-M2
Adaptable public space



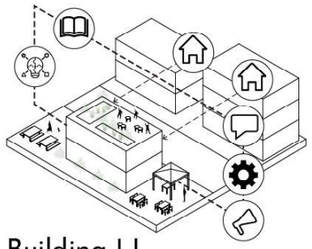
Open space | M

UR-M3
Open ground floor



Building | M

UR-M4
Comprehensive center

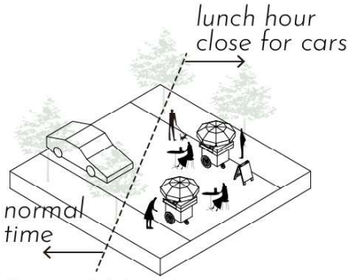


Building | L

UR-M5
Mixed use

Buildings | L

UR-M6
Use at different time of the day

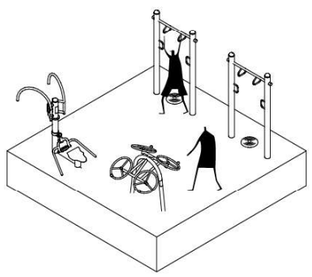


Street | M

SPATIAL

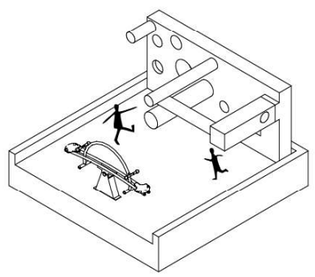
Accessible open and green space

UR-A1
Sports field



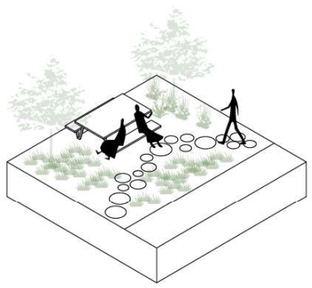
Open space | S

UR-A2
Playground



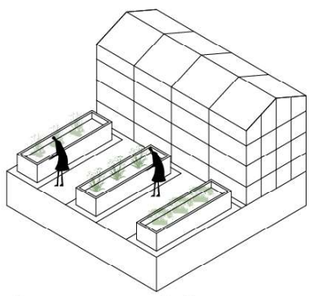
Open space | S

UR-A3
Pocket park



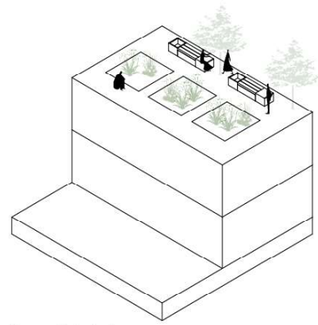
Green space | S

URA-4
Urban farming



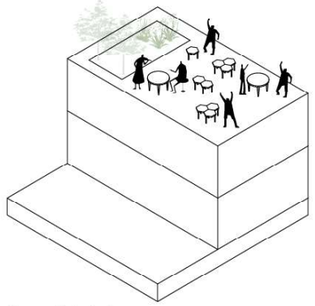
Open space | S

UR-A5
Green rooftop



Roof | M

UR-A6
Social activity rooftop



Roof | M

Urban renewal

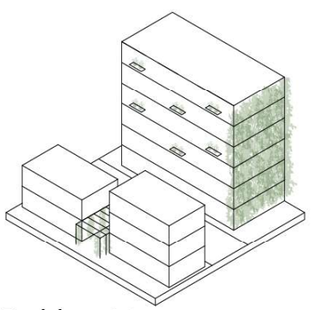
Urban renewal describes strategies of spatial upgrading towards a quality and diverse built environment. It is a collection of long-term strategies.

The primary aspects here include multi-use public space, accessible open and green space, renovated building, prioritized soft mobility, and climate-resilient utility.

In a general context, the tools are taken to enable a self-sufficient community and raise the standards of people's living.

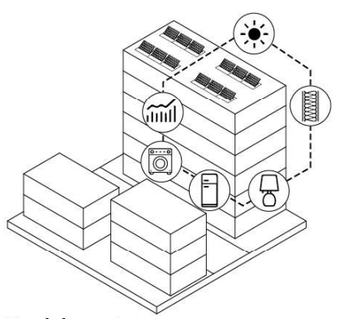
SPATIAL
Renovated building

UR-R1
Increased greenery



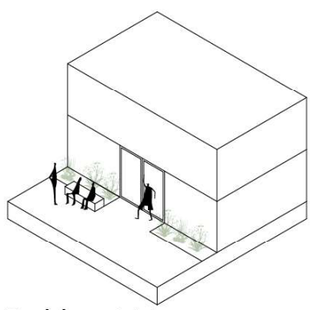
Building | L
eg. Green facade, Green balcony, Creeper grille

UR-R2
Energy-saving retrofit



Building | L
eg. Building envelope, Energy monitoring, Smart appliance etc.

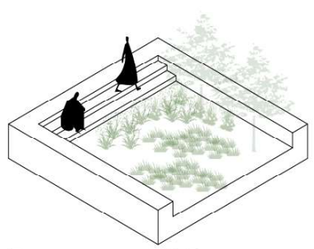
UR-R3
Activated entrance



Building | M

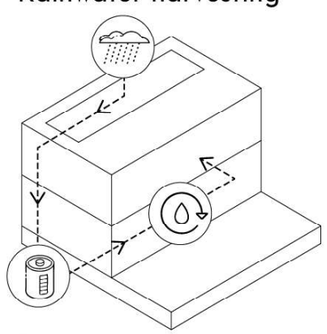
SPATIAL
Climate-resilient utility

UR-C1
Micro-climate



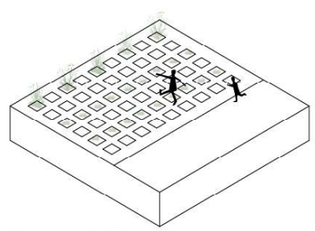
Green space | S

UR-C2
Rainwater harvesting



Building | M

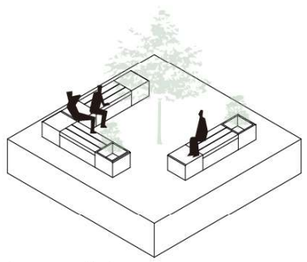
UR-C3
Permeable surface



Street | S

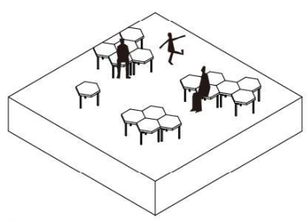
SPATIAL
Prioritized soft mobility

UR-P1
Modular furniture



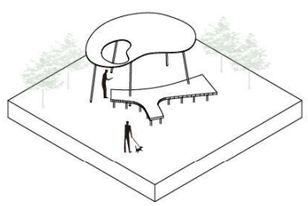
Street | S

UR-P2
Movable furniture



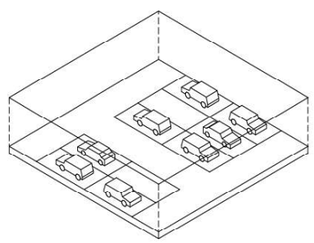
Street | S

UR-P3
Streetscape design



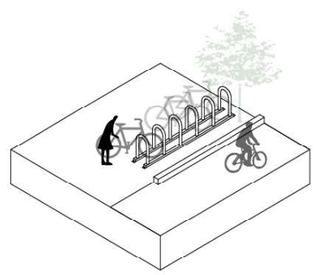
Open space | M

UR-P4
Underground parking



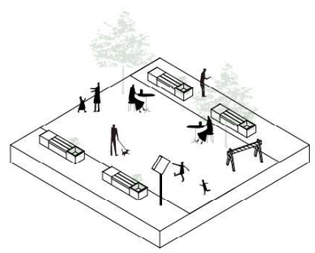
Underground space | L

UR-P5
Bicycle parking



Street | S

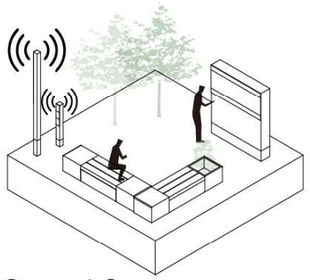
UR-P6
No-vehicle pedestrian walkway



Street | M

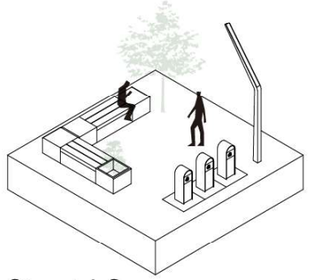
SPATIAL
Smart infrastructure

DT-S1
Public WiFi and recharge infrastructure



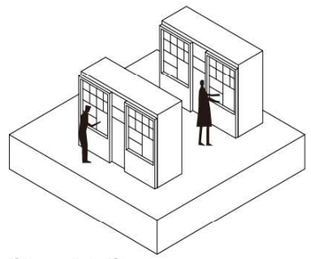
Street | S

DT-S2
Smart street furniture



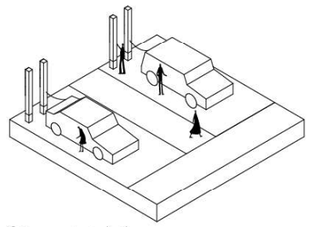
Street | S
eg. Street furniture, trash can, street light

DT-S5
Delivery lockers



Street | S

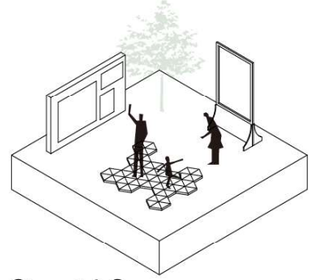
DT-S5
E-mobility infrastructure



Street | M

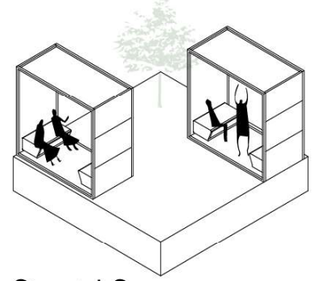
SPATIAL
Augmented interesting experience

DT-A1
Interactive installations



Street | S

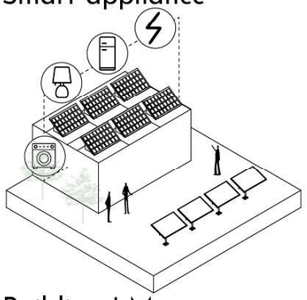
DT-A2
Virtual reality



Street | S

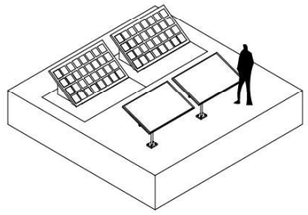
SPATIAL
Energy transition

DT-E1
Smart appliance



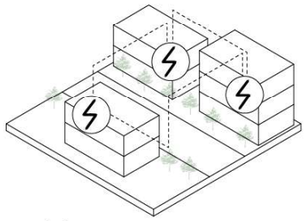
Building | M

DT-E2
Solar units



Open space | S

DT-E3
Smart grid



Buildings | L

Digital transition

Digital transition articulates the strategies of embedding digital technology into residents' lives and community operations. It is a collection of long-term strategies.

The primary aspects here include smart infrastructure, augmented interesting experience, energy transition, offer online service for off-line, digital inclusive access, and digital literacy.

In a general context, the tools are taken to nurture smart communities and better people's lives in day-to-day activities.

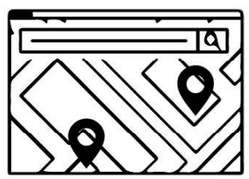
NON-SPATIAL

Offer online service for off-line

DT-O1
Promote more online shopping

DT-O2
Monitoring system
eg. Energy footprint

DT-O3
Information sharing



eg. Community service map, Heat map

DT-O4
Home service: healthcare, office, education etc.

NON-SPATIAL

Digital inclusive access

DT-D1
Affordable device

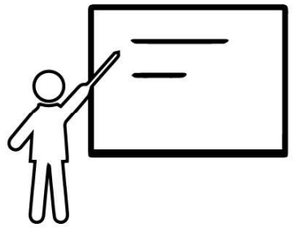
DT-D2
Home access

DT-D3
Public access to internet

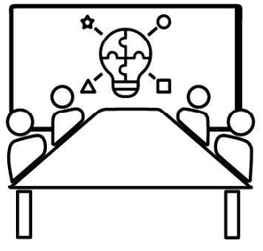
NON-SPATIAL

Digital literacy

DT-L1
Knowledge dissemination



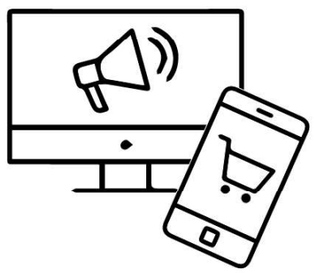
DT-L2
Skills development



NON-SPATIAL

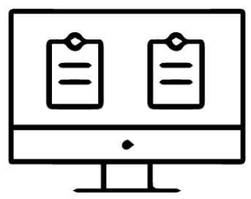
Timely communitcation

PE-P1
Communication platform



PE-P2
Dialect programmes to communicate

PE-P3
Notice board



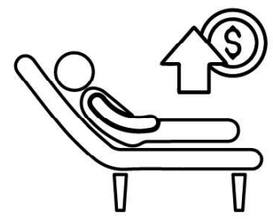
NON-SPATIAL

Economical and social support for vulnerable groups

PE-E1
Elderly

PE-E2
Low-income

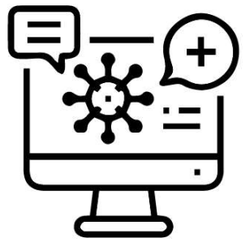
PE-E3
Community staff



NON-SPATIAL

Inclusive education

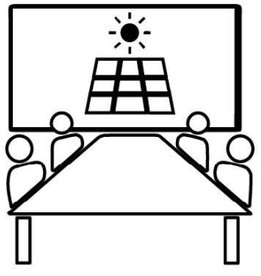
PE-I1
Health and safety consciousness



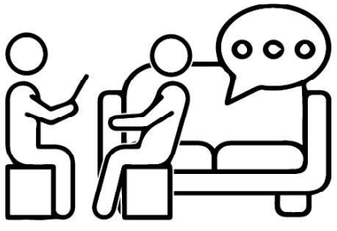
PE-I2
Disaster prevention exercise

PE-I3
Digital literacy

PE-I4
Traning and skill of green job



PE-I5
Psychological counseling



Public engagement

Public engagement displays the strategies of encouraging the active involvement of multiple actors in community building. It is a collection of strategies that run through the entire process.

The primary aspects here include timely communication, economic and social support for vulnerable groups, inclusive education, multi-sectors' engagement, and foster a sense of belonging.

In a general context, the tools are taken to promote residents' sense of belonging and kindle a close-knit community.

NON-SPATIAL

Multi-sectors' engagement

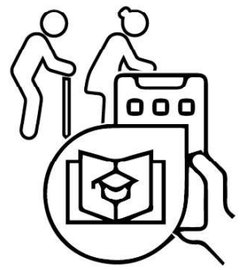
PE-M1
Enterprise/business collaboration

PE-M2
Digital engagement

PE-M3
Design workshop

PE-M4
Intergenerational co-living

PE-M5
Volunteer activity

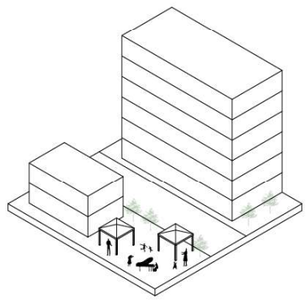


PE-M6
Festival activity

SPATIAL

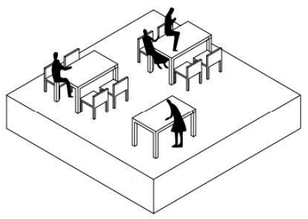
Foster a sense of belonging

PE-F1
Activity club



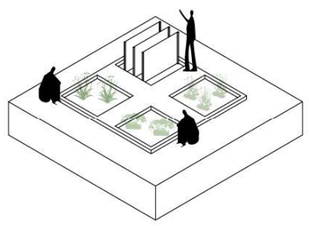
Open space | L

PE-F2
Maker lab



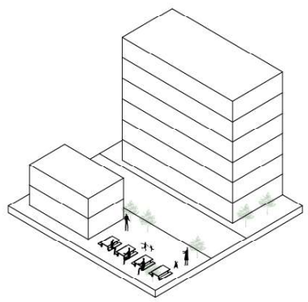
Open space | S

PE-F3
Circular gardens



Green space | S

PE-F4
Learning center



Building | L

4 Strategic frameworks

4.1 Overall timeline

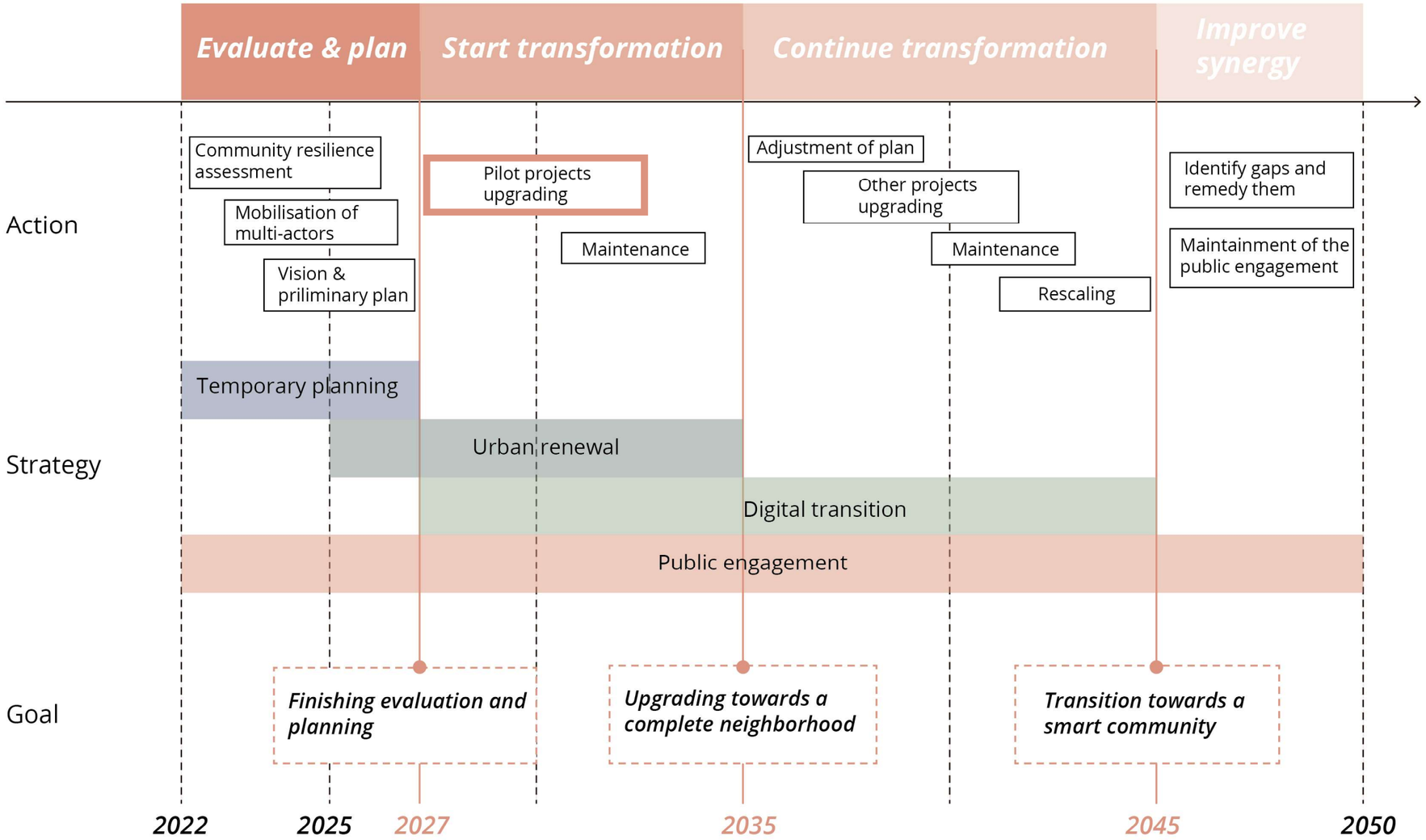


Fig.6.4.1 Overall strategy timeline
Source: Author

This Strategy Timeline provides an overview of four main stages with stage milestones, strategies, and key actions. The key moves not only could be applied in the selected community but also be spread to the whole city in the long term.

The final goal is to create a livable and smart built environment. One where spatial and digital settings contribute to the liveliness and self-sufficiency of the community, and where people could live a good life even if a crisis occurs. Those strategies for community resilience will make the community more capable and united, providing a foundation for further sustainable development.

There are four main steps for incremental change.

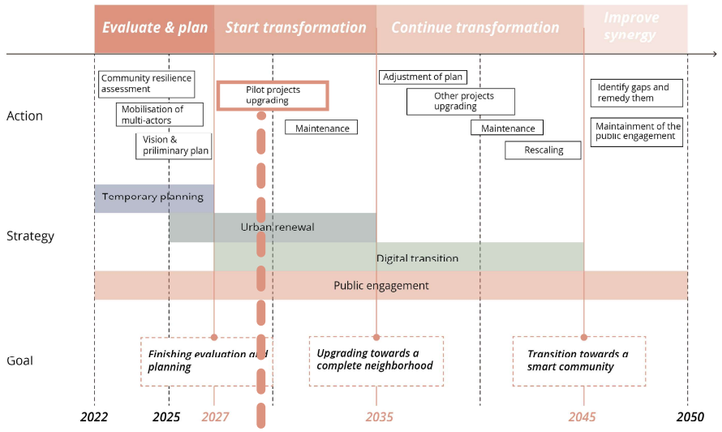
1. Evaluate & plan
Contextual analysis and initial assessment lay the groundwork for the preliminary planning. Also, the mobilization of multi-actors is very important during the start-up phase.

2. Start transformation
Popular activity spots with obvious problems in the community could be a great testing ground for strategies that combine spatial and non-spatial tools. Those pilot projects are taken to test the practicality of strategies and gain data on how people rate them.

3. Continue transformation
Reevaluation of the pilot project and the feedback of the public could offer great opportunities to refine the application of strategies and adapt the local design to the changing residents' needs.
Then, it is time to upgrade other projects in the whole community. Still, reassessment and feedback are vital for further adjustments.
At the same time, the valuable lessons from the pilot projects could form the base for other communities in Wuhan to follow suit.

4. Improve synergy
The adoption of resilience strategies is a long-term process, which means it will constantly adapt and integrate to accommodate changing needs of people. Public engagement is essential throughout the whole process.

4.2 Project upgrading guideline



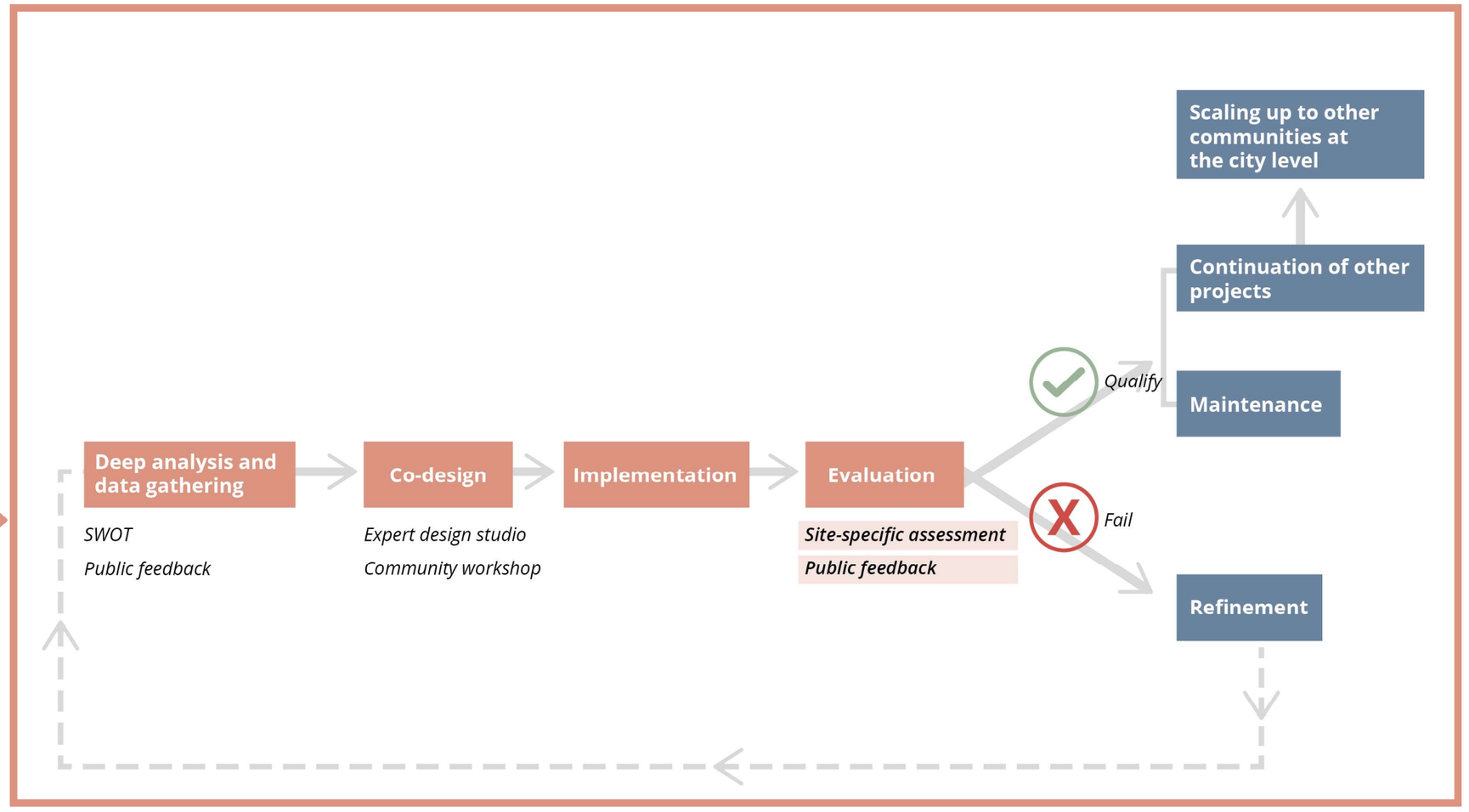
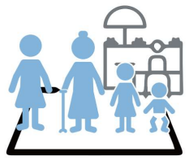
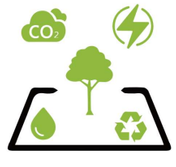


Fig.6.4.2 Project upgrading process
Source: Author

The project-specific upgrading goes through four steps: deep analysis and data gathering, co-design, implementation, and evaluation.

In the last part, the rules guide the user to test the quality of the project by combining objective site-specific assessment and subjective public feedback. If the project is qualified, it would be the time to scale up to other communities at the city level. If the project is failed in the evaluation, it would learn from lessons and get refinement by restarting the upgrading loop.

1 Site-specific assessment

Use and user 	Number of users during the day and night			
	Variety of users in the space (age, gender, ability, ethnicity)			
	Presence of different inclusive activities in the public space among time (for children, elderly, disable people, etc)			
	Presence of non-designed, temporary activities, organised by the local governance and the community			
	Presence of formal and informal economic activities (food sellers, kiosks/shops, etc)			
Comfort & safety 	Protection against vehicular traffic			
	Level of security of the public space			
	Quality of censorial experience (pleasant sounds/smellls/views)			
	Presence of a public space identity, determined by cultural background and users' enjoyment			
	Aesthetic value			
	Human scale design			
Amenities & furniture 	Presence and quality of amenities for recreational structures			
	Presence and quality of seating			
	Presence and quality of bike racks			
	Presence and quality of signage and emergency items			
	Presence and quality of digital structures			
Green environment 	Presence and quality of biodiversity in the public space			
	Presence of energy effcient elements in the public space			
	Presence of green or blue spaces against environmental risks			

= GOOD

(There are many improvements.)

= FAIR

(No change required in itself, or it is slightly improved.)

= POOR

(Conflicts or problems arise.)

The Site-specific Assessment looks at four main dimensions which get references from The Site-Specific Assessment Guidelines (Chong et al., 2020) and Twelve Urban Quality Criteria (Twelve Quality Criteria, 2021).

The four aspects are use and user, amenities and furniture, comfort and safety, and green environment. In total, 19 indicators were chosen to be evaluated and show at a glance, which part of the project is performing well, fair or poor.

Fig.6.4.3 Site-specific assessment
Source: Author, adapted from The Site-Specific Assessment Guidelines and Twelve Urban Quality Criteria (see Appendix 2 and Appendix 3)

2 Public feedback (led by neighborhood committee and planning institute)

Primary Stakeholders

Residents (housing association)

The low-income

The elderly

Property company

Neighborhood staff

.....

Secondary Stakeholders

Vendors/Retailers

Supermarket/pharmacy enterprises

Volunteers

.....

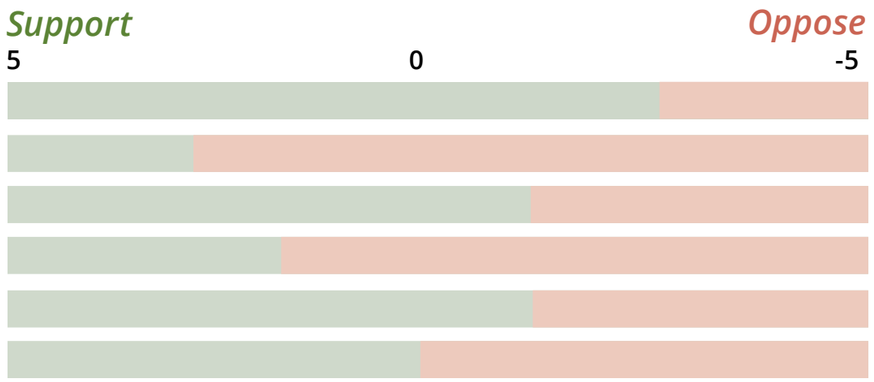
Wider Stakeholders

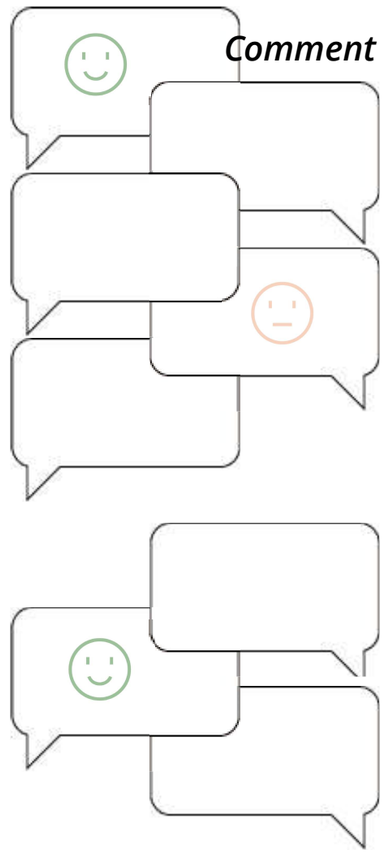
NGO

Other enterprises

Passers-by

.....





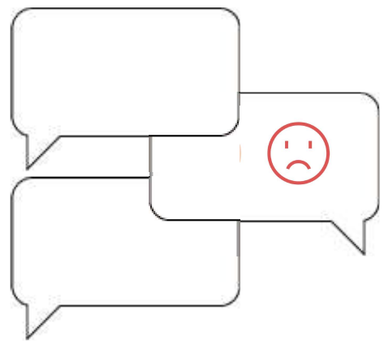
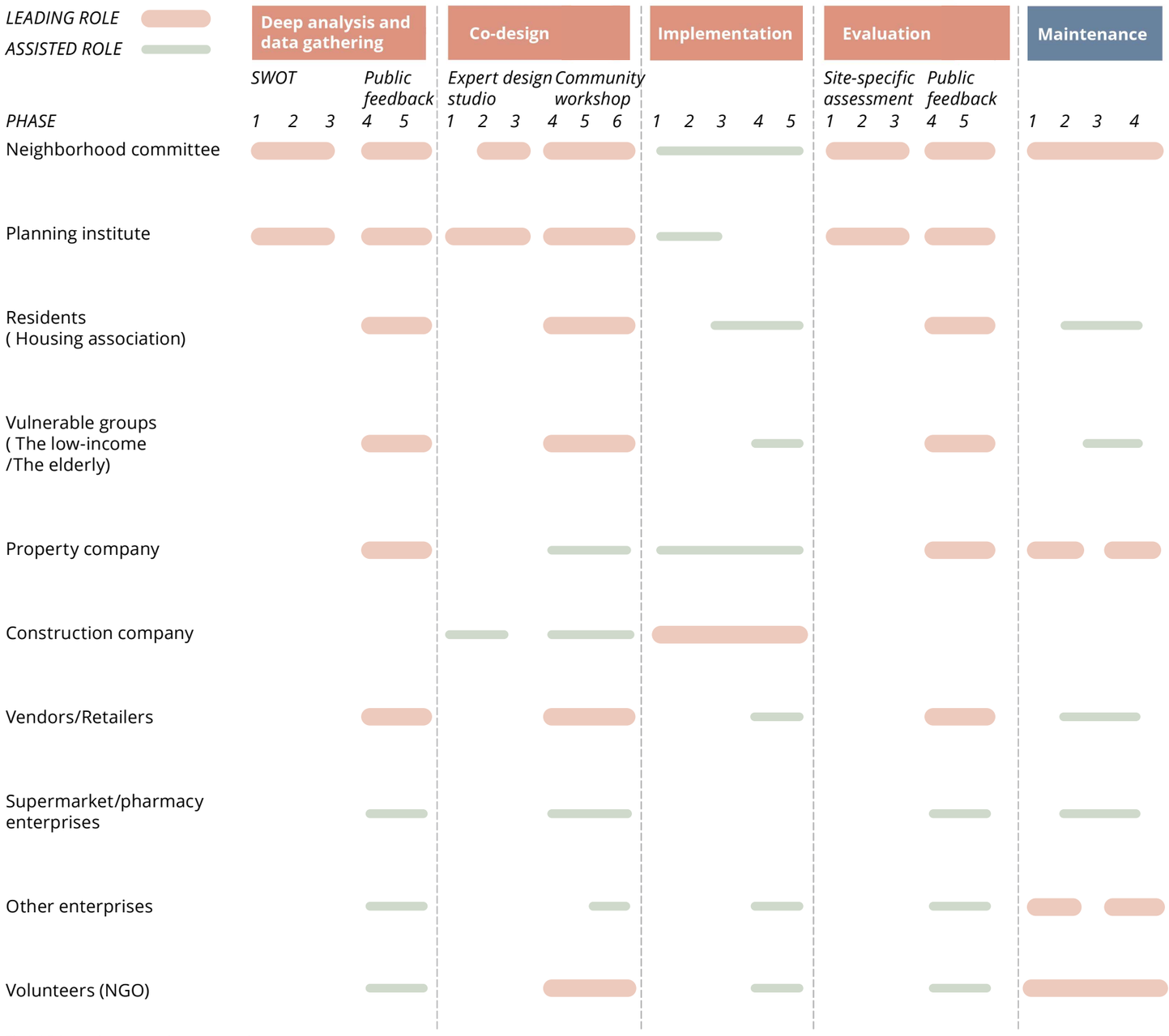


Fig.6.4.4 Public feedback
Source: Author

The public feedback is led by the neighborhood committee and planning institute. Through interviews and meetings, stakeholders could discuss their feelings and comment on the most impressive ideas about the project.

In this process, primary and secondary stakeholders have more impact and decision power than wider stakeholders.

Actors involvment



	Role in the process	Responsibility	Interest
Neighborhood committee	The coordinator and intermediary between various stakeholders The most powerful desicion-maker	Lead and drive the projects Protect the rights and interests of residents	Be capable to cope with crisis Regulate and safeguard community operations
Planning institute	The visioner and trigger The facilitator with knowledge and tools	Provide professional knowledge Guide local design	Ensure local designs follow the general direction Encourage the locals actively engage in community building
Residents (Housing association)	Who are most directly affected by community building Key decision-maker	Fully engage in the whole process of community resilience building	Qualified public facilities and public spaces Sufficient living necessities Adequate knowledge of crisis and health Social interaction
Vulnerable groups (The low-income /The elderly)	Who are most directly affected by community building Decision-maker	Express special needs Fully engage in the whole process of community resilience building	Inclusive design Extra financial or psychological support Qualified public facilities and public spaces Sufficient living necessities Adequate knowledge of crisis and health Social interaction
Property company	External force to help to manage the community	Provide property services for residents Assist neighbourhood committee to undertake public affairs	Profits from community management Branding
Construction company	Constructor	Make sure the projects are carried out according to planning and design Offer technical support	Profits from building construction projects
Vendors/Retailers	Who are potential users and they can promote community building	Take part in relevant projects and public events	Qualified public space Profits from business
Supermarket/pharmacy enterprises	External forces	Provide living necessities for residents Participate in community emergency planning	Profits from business Branding
Other enterprises	External forces	Provide services for residents Participate in community emergency planning	Profits from business Branding
Volunteers (NGO)	External forces	Assist neighbourhood committee to undertake public affairs Provide academic and technical support	Social cohesion Academic research value General knowledge and health awareness for all

Fig.6.4.5 Actors involvment in the upgrading process
Source: Author

5 Location-based schematic frameworks

5.1 Vision plan —— neighborhood scale

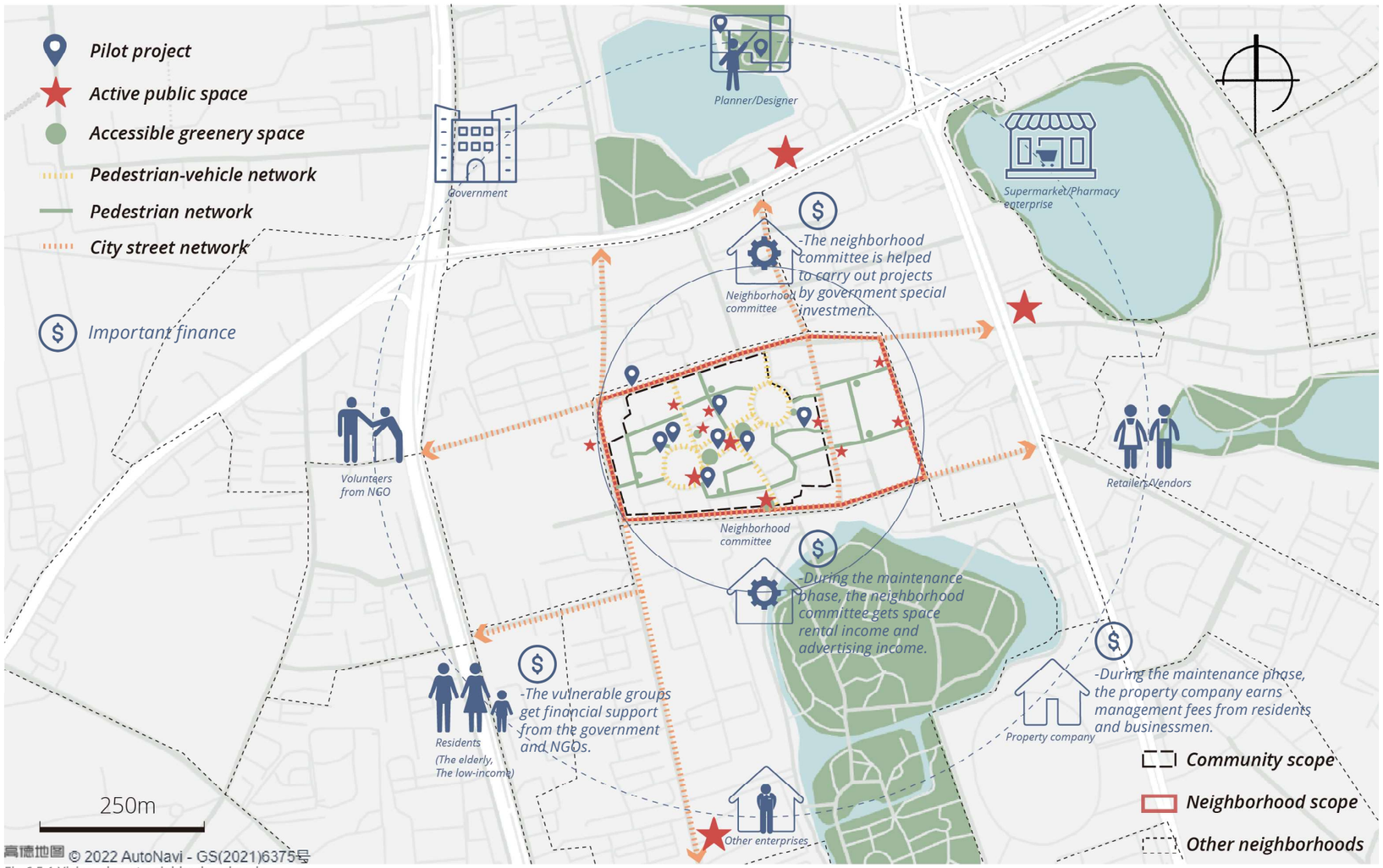


Fig.6.5.1 Vision plan at neighborhood scale
Source: Author, based on AMAP

The schematic framework ensures the whole neighborhood is planned historically. It gives an overview of which sites to prioritize and guide strategies adopted with close consideration of the local context.

Pilot projects are chosen because they are hot spots of activity but with notable problems and huge improving potential. They are utilized to examine the suitability and effectiveness of strategies.

The aim is to create a connected and active neighborhood plan as well as mutually cooperative governance, where urban taking improves livability and cohesion of the community.

Regarding the governance of the neighborhood, the neighborhood committee acts as an intermediary to coordinate and organize all stakeholders.

First, it strengthens cooperation with social enterprises such as supermarkets, pharmacies, and retailers to secure logistics of daily necessities. Then, it brings in property companies to maintain community spaces and infrastructure. Last, it enhances cooperation with voluntary agencies to aid vulnerable groups.

The government increases funding and subsidies for neighborhood upgrading and disadvantaged groups and assigns planners to work with the district.

Residents are encouraged to set up housing organizations and actively engage in activities as well as give feedback.

5.2 Spatial framework —— community scale

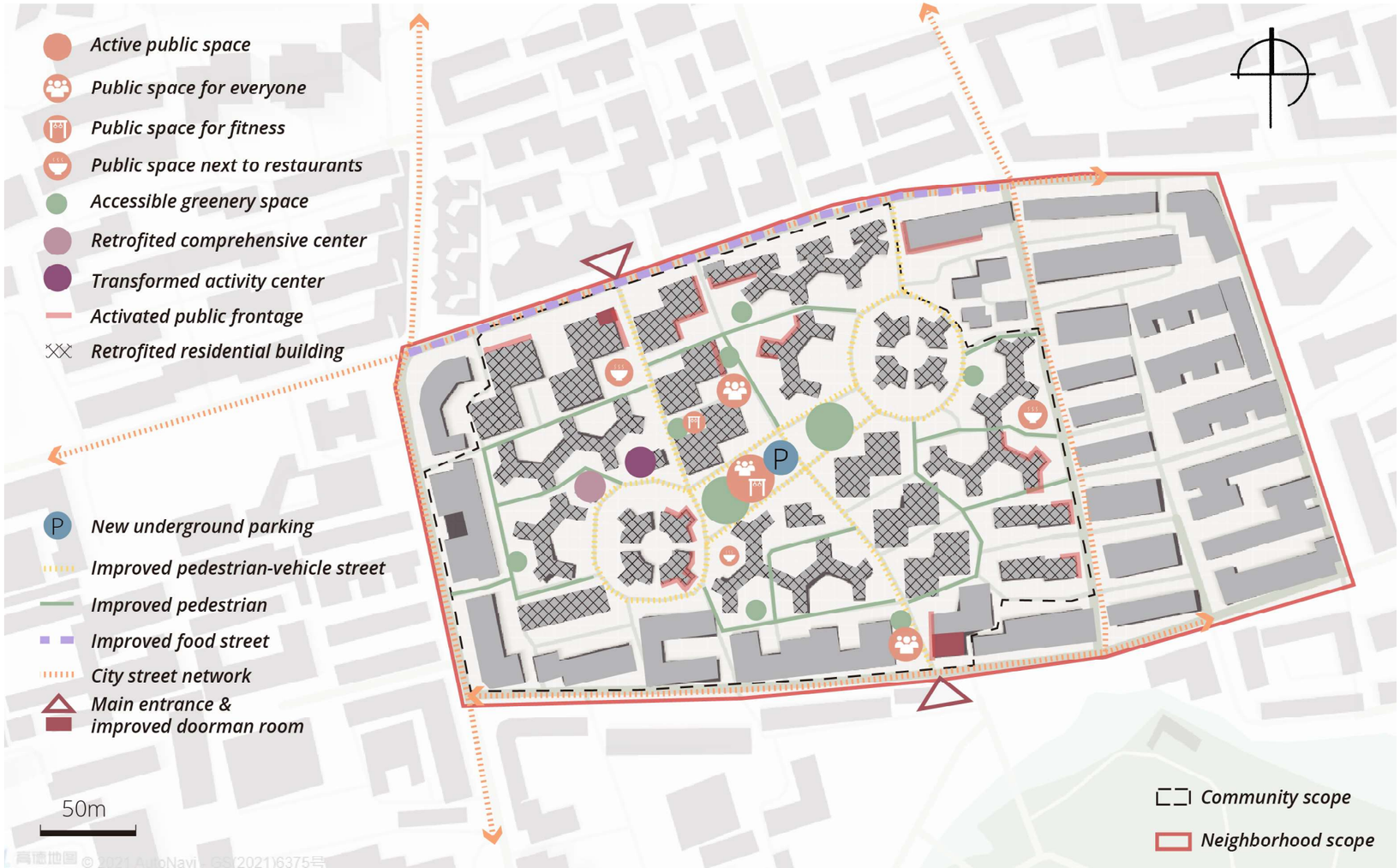


Fig.6.5.2 Spatial framework at community scale
Source: Author, based on AMAP

The spatial framework hopes to make an accessible and high-quality plan of public space, greenery space, pedestrian and pedestrian-vehicle network.

First, popular public open spaces will be identified and classified as spaces for everyone, spaces for fitness, spaces next to restaurants, public frontage, and accessible greenery spaces. They are improved and activated to meet the users' demands for leisure, exercise, and social interaction.

Second, the comprehensive center and the activity center are emphasized to provide better services for the residents, which also enhance residents' engagement and sense of belonging.

Third, the road network is classified as pedestrian and pedestrian-vehicle streets to improve security and comfort, which better links various public space nodes. New underground parking is set up to solve the issue of scarce parking spaces.

Last, residential housing is retrofitted for energy-saving, greening, and digital transition, raising residents' living standards.

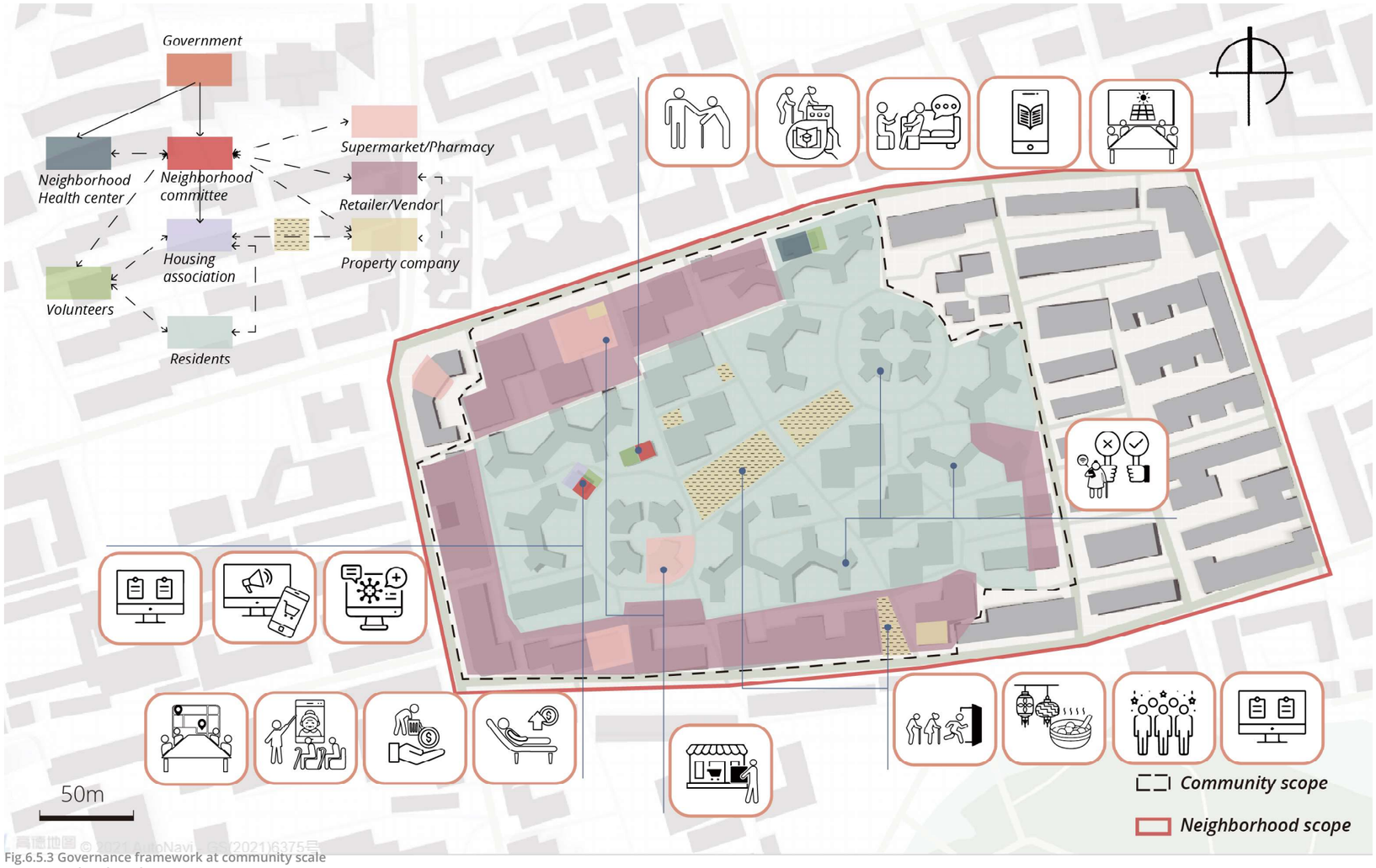
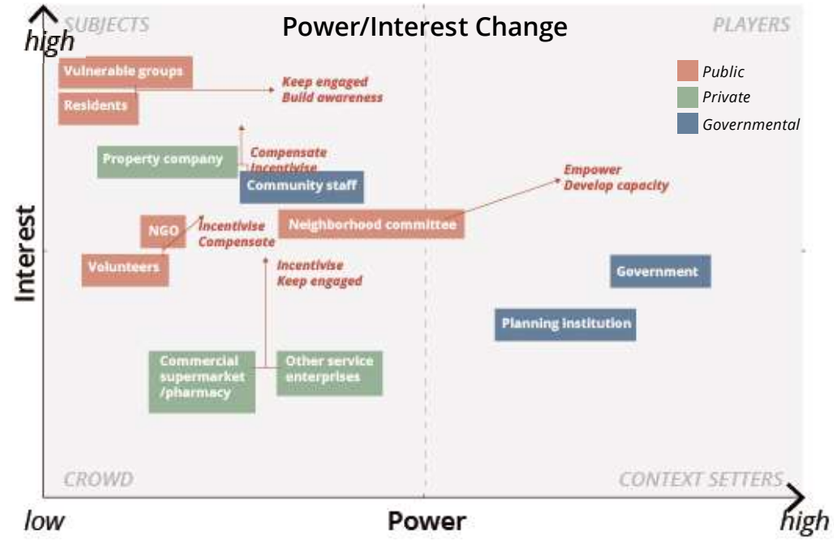


Fig.6.5.3 Governance framework at community scale
Source: Author, based on AMAP



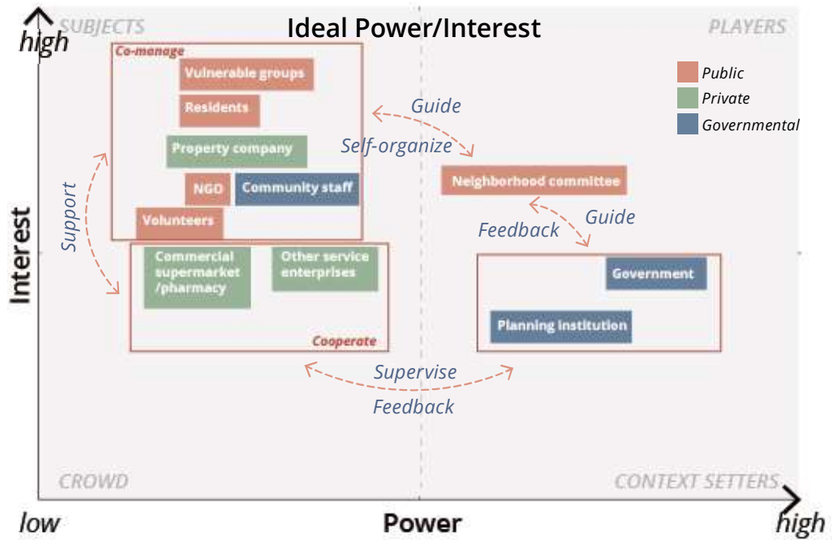


Fig.6.5.4 Power/Interest matrix
Source: Author

For overall stakeholders, the ideal situation is mutually cooperative governance. The relationships of the main stakeholders are shown in the map and diagram above.

In the position and power-interest matrix analysis, it is obvious to discover the main groups of stakeholders whose engagement is urgent for enhancement.Residents and vulnerable groups have strong interests but suffer limited power to meet their needs. The neighborhood committee has strong interests but little power to organize the community-scale process. Private enterprises like supermarkets, and pharmacies, which have resources have little interest to give a helping hand. Similarly, the interest is not enough to support working staff including volunteers, property managers, and community staff to endure overloaded work.

Thus, to achieve cooperative governance, there are several vital steps to take.

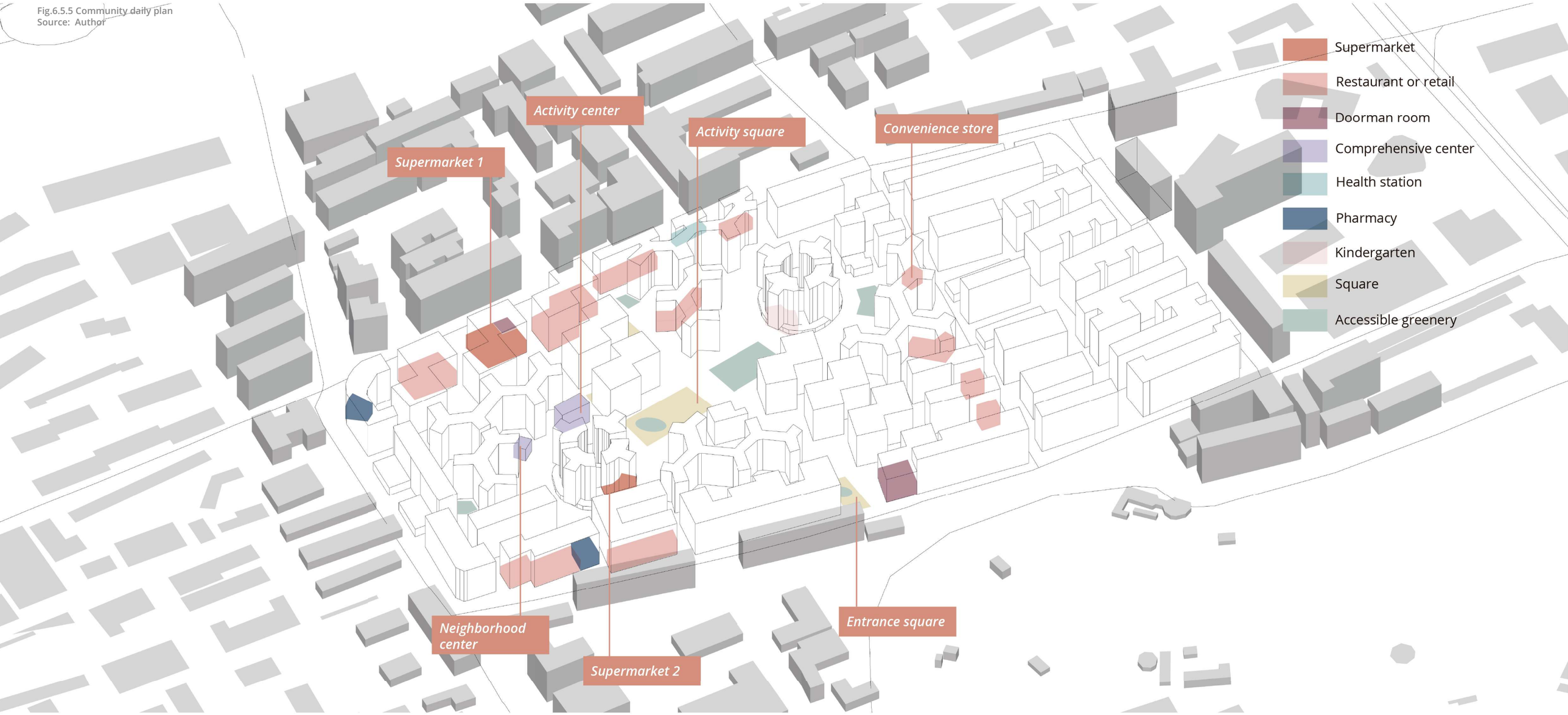
Firstly, it is very important to keep residents and vulnerable groups engaged and build their awareness. For example, providing education and professional information is beneficial for both health awareness and willingness to express needs and participate in the community decision-making process.

Secondly, empowering the community and developing the capacity is key for the community to respond quickly to the pandemic. For instance, when the pandemic spread in the early stage, the community which is self-organized with expertise staff can rapidly implement temporary actions and emergency plans without waiting for the higher-level instructions.

Thirdly, Incentivizing and engaging private enterprises like supermarkets, and pharmacies play a vital role in the pandemic period, especially there is a huge shortage of human resources.

Last, working staff including volunteers, NGOs, property managers, and community staff deserve better safety management and encouragement.

Fig.6.5.5 Community daily plan
Source: Author

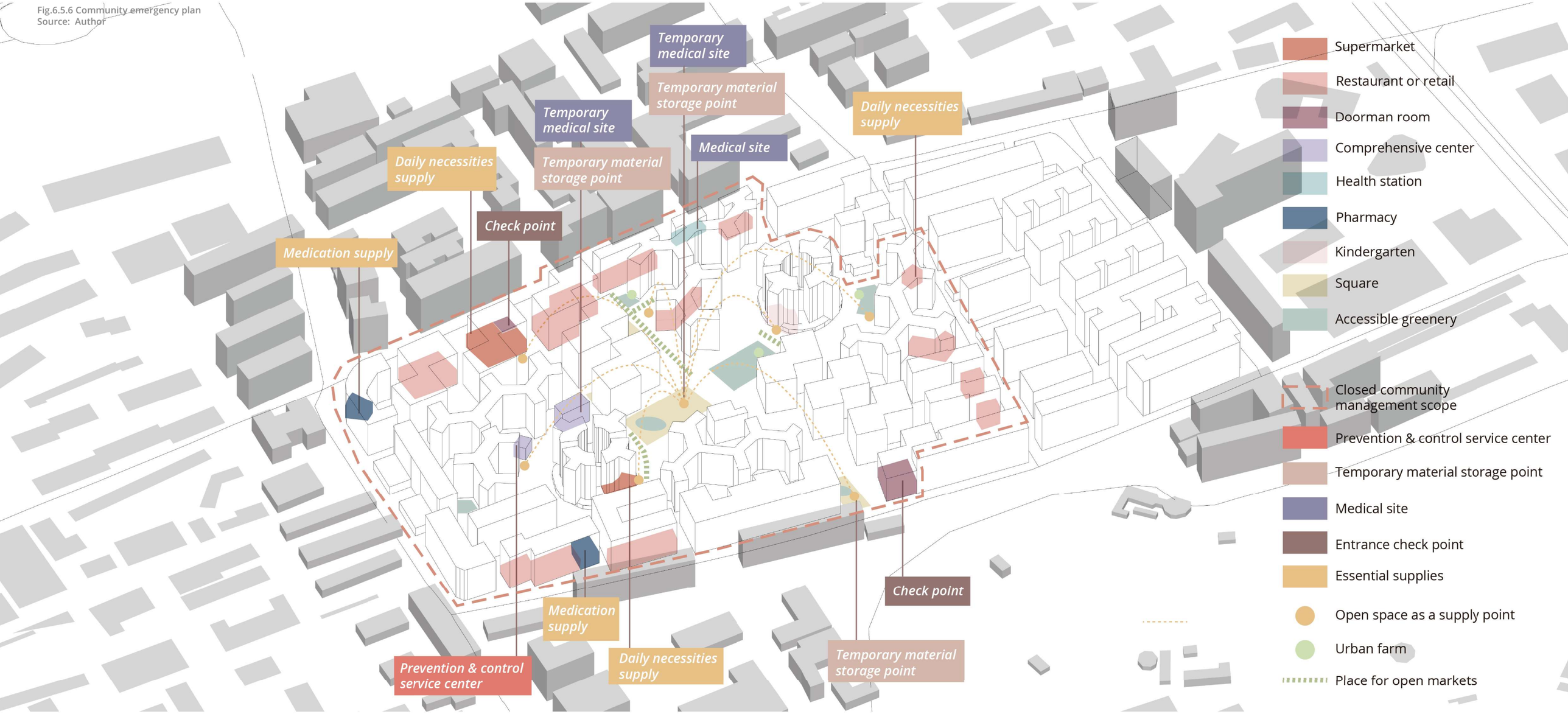


The plan highlights the public space and public facilities system that can meet the needs of the residents to purchase daily necessities and services, as well as socialize and relax.

Among them, the neighborhood center is mainly responsible for administrative functions, including communication with residents, community security and welfare, and community public health and disease prevention together with the health station.

The community activity center has a gymnasium, reading room, multimedia, etc., and together with the activity square, it organizes cultural activities to create a community culture.

Fig.6.5.6 Community emergency plan
Source: Author



During the pandemic, the community will have entrance checkpoints for temporarily closed community management. Node public buildings and open spaces will be switched to function with temporary adaptation space.

First, the neighborhood center will assume the primary function of prevention and control services.

Second, larger public spaces or public buildings in the community will be set up as temporary medical sites.

Then, supermarkets, convenience stores, and pharmacies will become temporary supply points because they stock up on daily supplies. Urban farms can meet part of the food needs. Open markets will be chosen to be held in several active streets.

Finally, the activity plaza becomes the largest storage point for supplies and transfers supplies to pick-up points scattered throughout the community.

07 DESIGN

1 Selected pilot projects
2 The comprehensive center
3 The community square
4 The slow street
5 The hybrid street
6 Normal situation VS Pandemic situation

Wuhan gradually regains its lively market street landscape after 35 days of unsealing.
Source: https://www.sohu.com/a/394953613_345268

1 Selected pilot projects

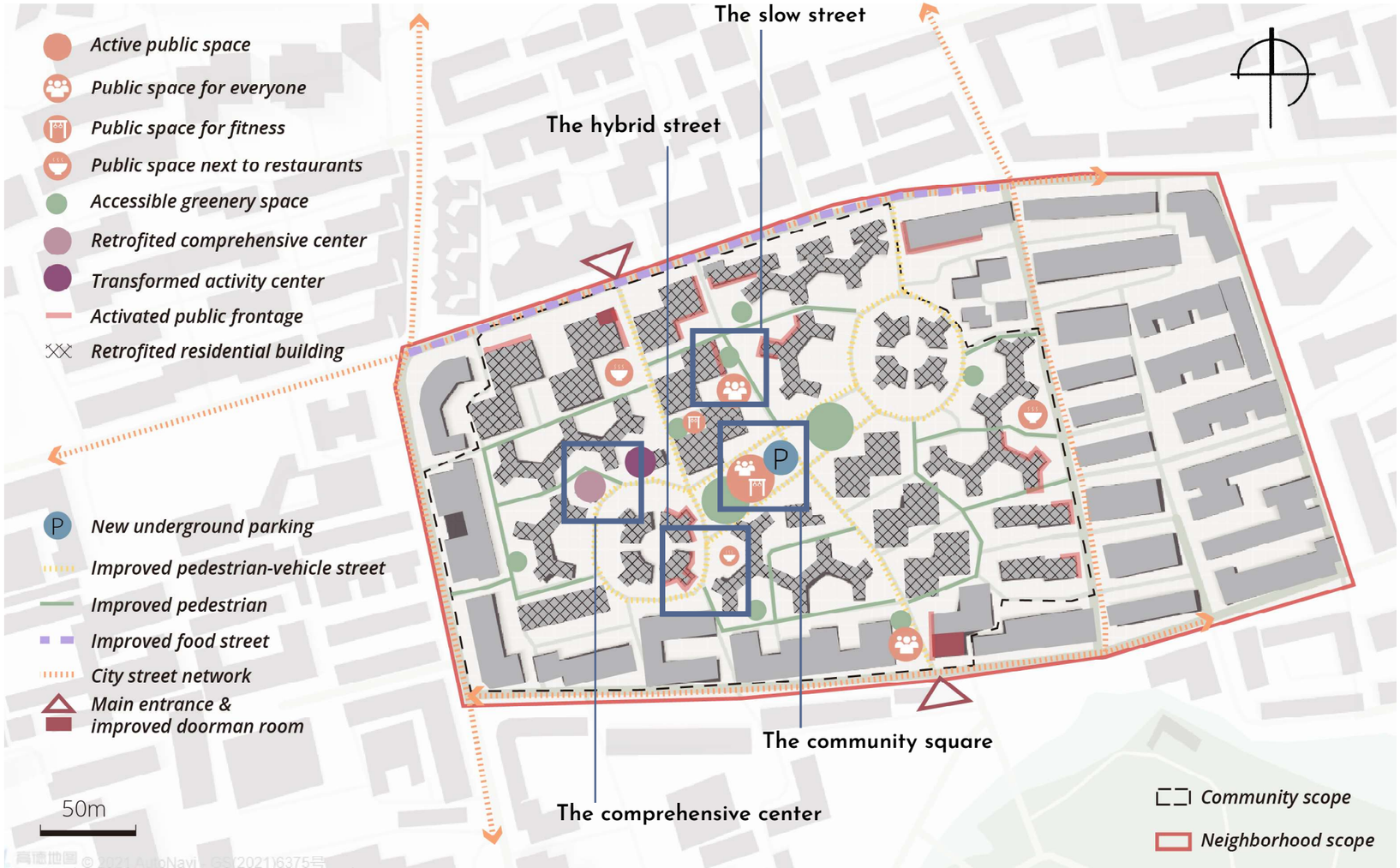


Fig.7.1.1 Selected pilot projects on the spatial framework
Source: Author, based on AMAP

Four pilot projects on the map above are picked because they are the hottest spots for activity but had obvious problems and great potential for improvement. Those design tests show how strategies are integrated with the local context and check the appropriateness and effectiveness of the strategies.

Main functions

Main users

2 The comprehensive center

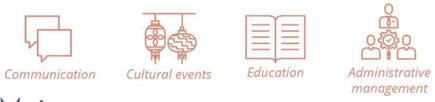
Before

Source: map.baidu.com

Source: Author

The low-quality neighborhood center is transformed into a good-quality and multifunctional comprehensive center.

Main functions



Main users

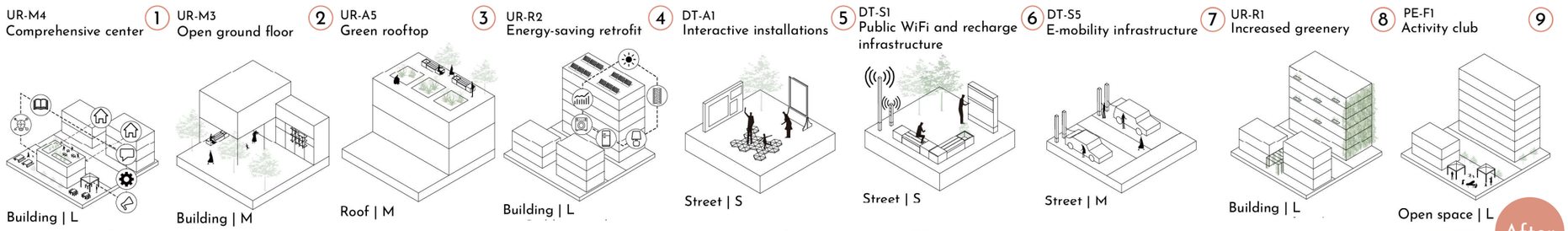
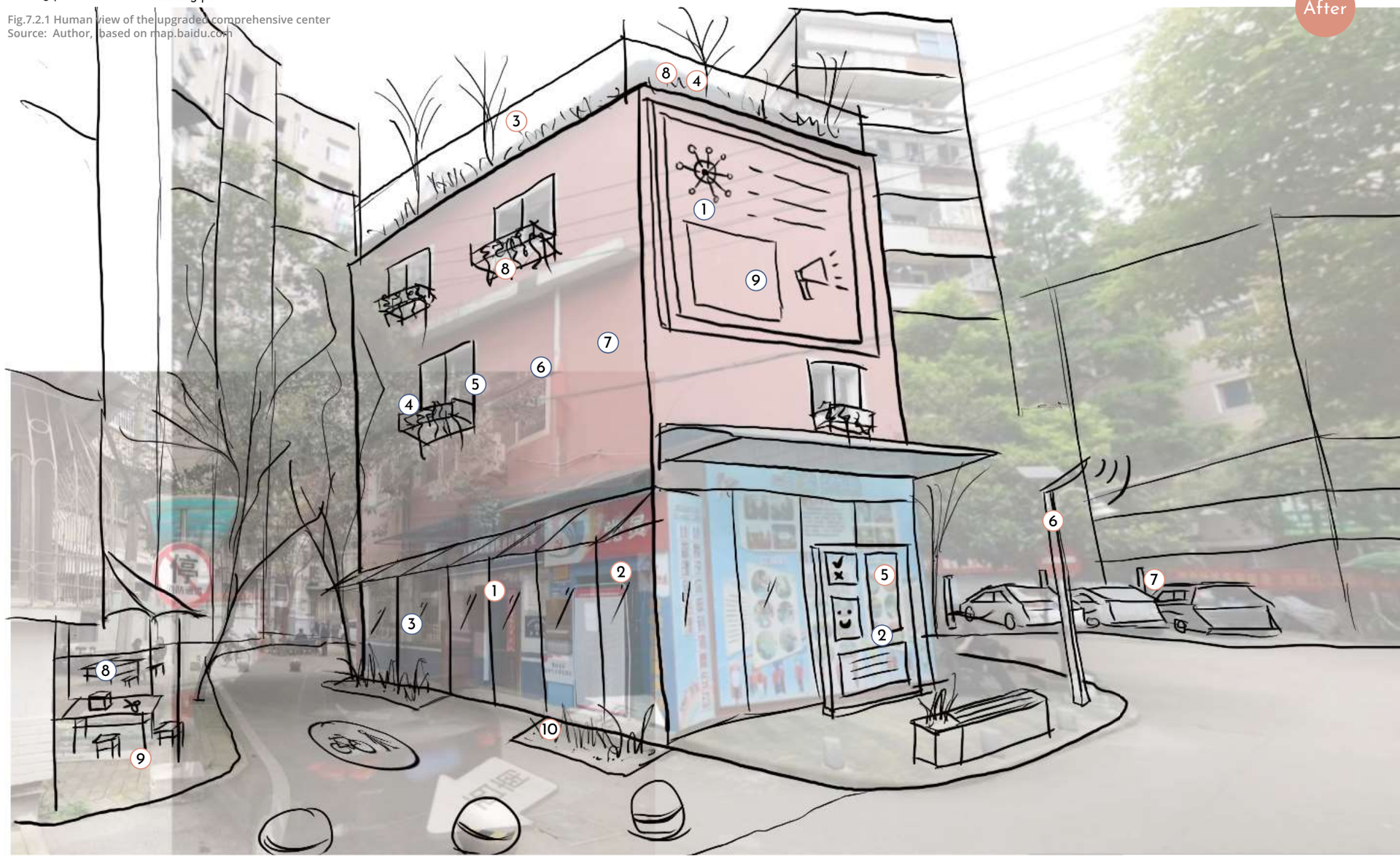
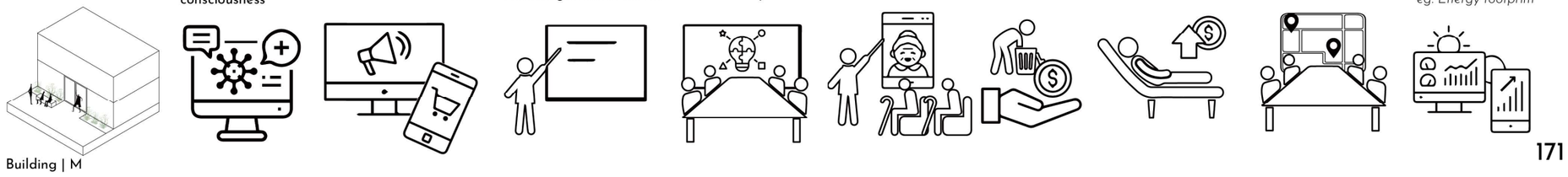


Fig.7.2.1 Human view of the upgraded comprehensive center
Source: Author, based on map.baidu.com

After





3 The community square

Before

Source: map.baidu.com

Source: Author

The community square is upgraded into an open and adaptable activity square that can hold a variety of activities.

Main functions

Communication · Cultural events · Sports · Leisure · Education

Main users

The low-income · The elderly · Residents · Volunteers

UR-M2 Adaptable public space — temporary use / open space — Open space | M

1 UR-A1 Sports field — Open space | S

2 UR-A2 Playground — Open space | S

3 UR-A3 Pocket park — Green space | S

4 UR-P1 Modular furniture — Street | S

5 UR-P2 Movable furniture — Street | S

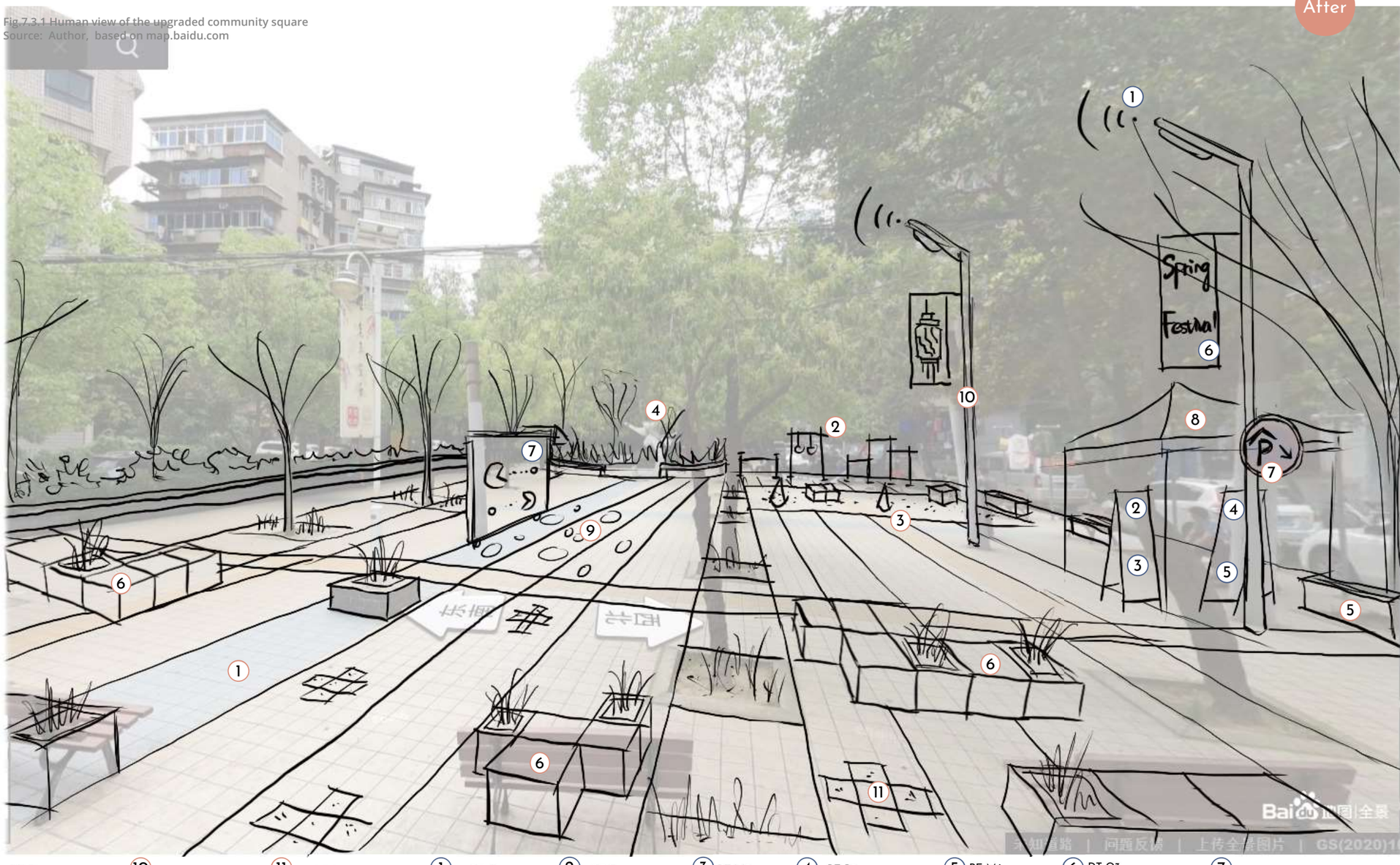
6 UR-P4 Underground parking — Underground space | L

7 PE-F1 Activity club — Open space | L

8 DT-A1 Interactive installations — Street | S

Fig 7.3.1 Human view of the upgraded community square
Source: Author, based on map.baidu.com

After



10 DT-S1 Public WiFi and recharge infrastructure — Street | S

11 DT-S2 Smart street furniture — Street | S
eg. Street furniture, trash can, street light

1 DT-D3 Public access to internet

2 PE-I2 Disaster prevention exercise

3 PE-I1 Health and safety consciousness

4 PE-M5 Volunteer activity

5 PE-P2 Dialect programmes to communicate

6 PE-M6 Festival activity

7 DT-O3 Information sharing
eg. Community service map, Heat map

4 The slow street

Before

Source: Author

The street is transformed into a shared street that enjoys an active ground floor and leisure space with restricted car access.

Main functions

Shopping | Communication | Cultural events | Leisure

Main users

Retailers/Vendors | Residents

UR-P6 No-vehicle pedestrian walkway — Street | M

URA-4 Urban farming — Open space | S

PE-F3 Circular gardens — Green space | S

UR-M1 Public frontage activation — Buildings | M

UR-M2 Adaptable public space — Open space | M

UR-P1 Modular furniture — Street | S

UR-P3 Streetscape design — Open space | M

UR-P5 Bicycle parking — Street | S

UR-C3 Permeable surface — Street | S

After

Fig.7.4.1 Human view of the upgraded slow street
Source: Author, based on map.baidu.com

DT-S1 Public WiFi and recharge infrastructure — Street | S

DT-S2 Smart street furniture — Street | S
eg. Street furniture, trash can, street light

PE-P3 Notice board

DT-D3 Public access to internet

DT-O2 Monitoring system
eg. Energy footprint

DT-O3 Information sharing
eg. Community service map, Heat map

PE-M1 Enterprise/business collaboration

DT-D2 Home access

PE-M2 Digital engagement

5 The hybrid street

Before

Source: Author

The hybrid street is upgraded to a thriving street for daily routines, accommodating a supermarket and various amenities.

Main functions

Shopping · Communication · Leisure

Main users

Retailers/Vendors · Residents

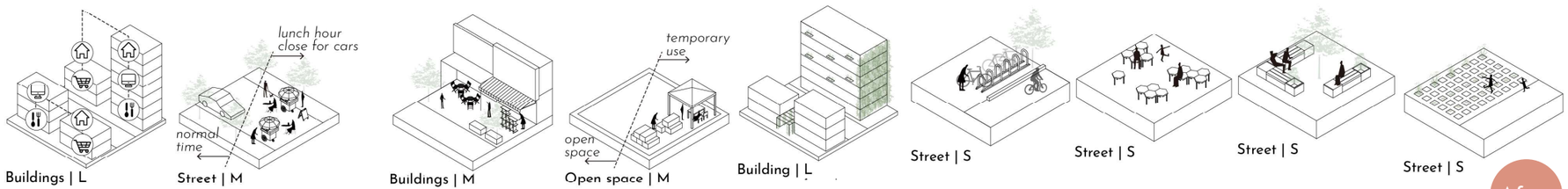
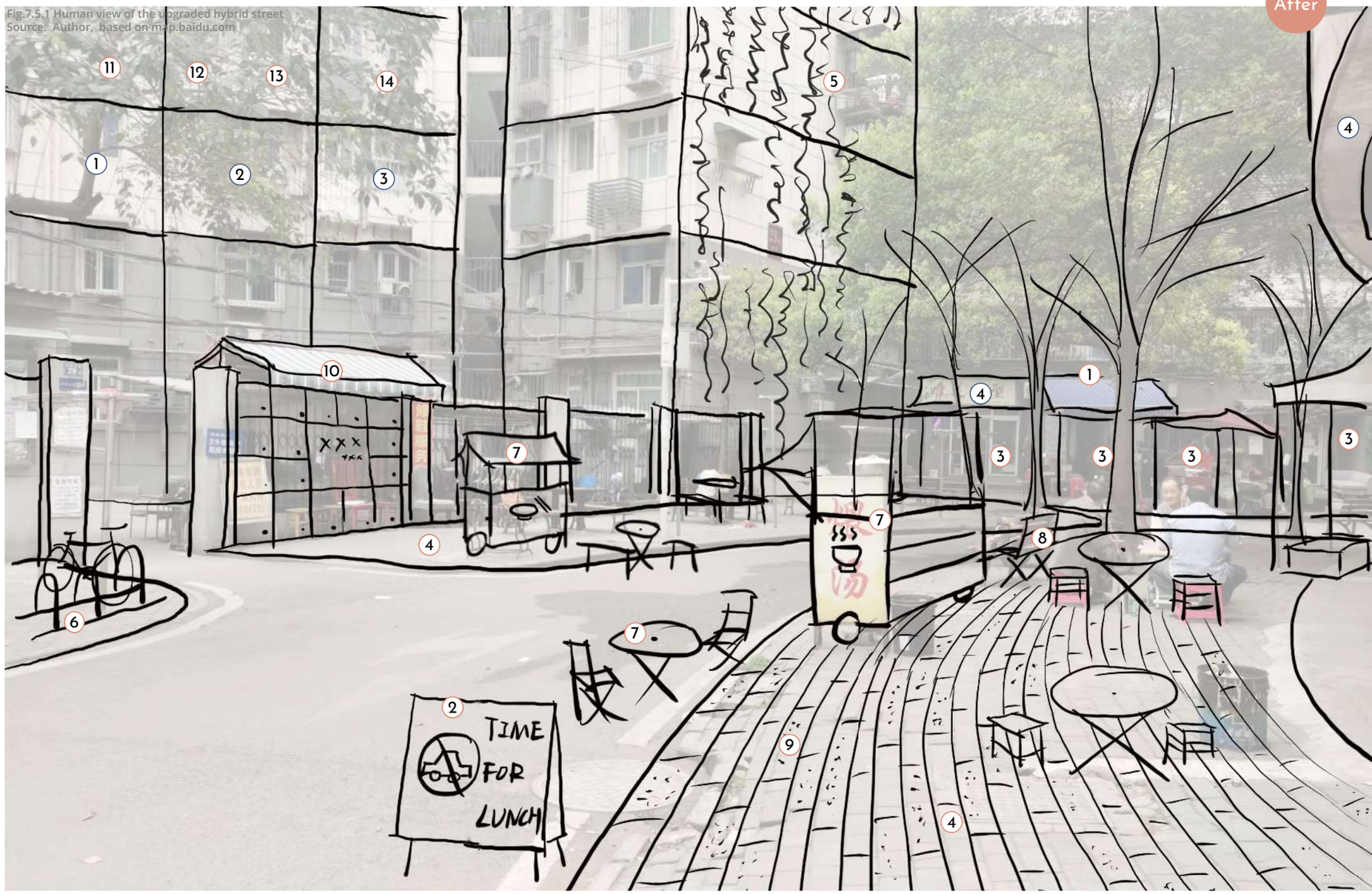
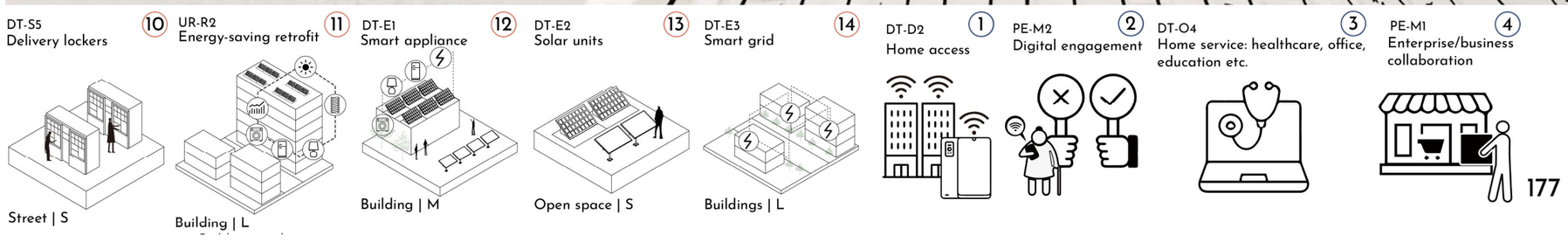


Fig.7.5.1 Human view of the upgraded hybrid street
Source: Author, based on map.baidu.com

After





Normal situation

Fig.7.6.1 Collage of daily community
Source: Author

Pandemic situation

Fig.7.6.2 Collage of community in the pandemic
Source: Author

08 CONCLUSION & REFLECTION

1 Reevaluation of community resilience
2 Answering research questions
3 Reflections
4 Further research

In the post-pandemic era, people are getting used to a new way of life. Street barbers cut hair for the people.
Source: https://www.jiemian.com/article/7571838.html

1 Reevaluation of community resilience

Great improvement
VS
Slight improvement

This section is intended to discuss the feasibility and effectiveness of strategies by reevaluating the community resilience and comparing it with the previous situation.

As shown in the diagram on the right, resilience shows significant improvements in the dimensions of community public spaces, facilities, social networks, governance structures, emergency management, and information and communication. In the aspects of traffic and economic basis, community resilience improves very little.

It can be seen that the community resilience framework and strategy toolkit proposed in this project is instrumental in elevating the quality of public space in the community, strengthening the level of community governance, and improving the social cohesion of the community, ultimately increasing the overall community resilience.

However, the solutions in this project do not improve much in terms of transportation and economic base. The relationship between community resilience and traffic and economic base needs to be studied in depth.

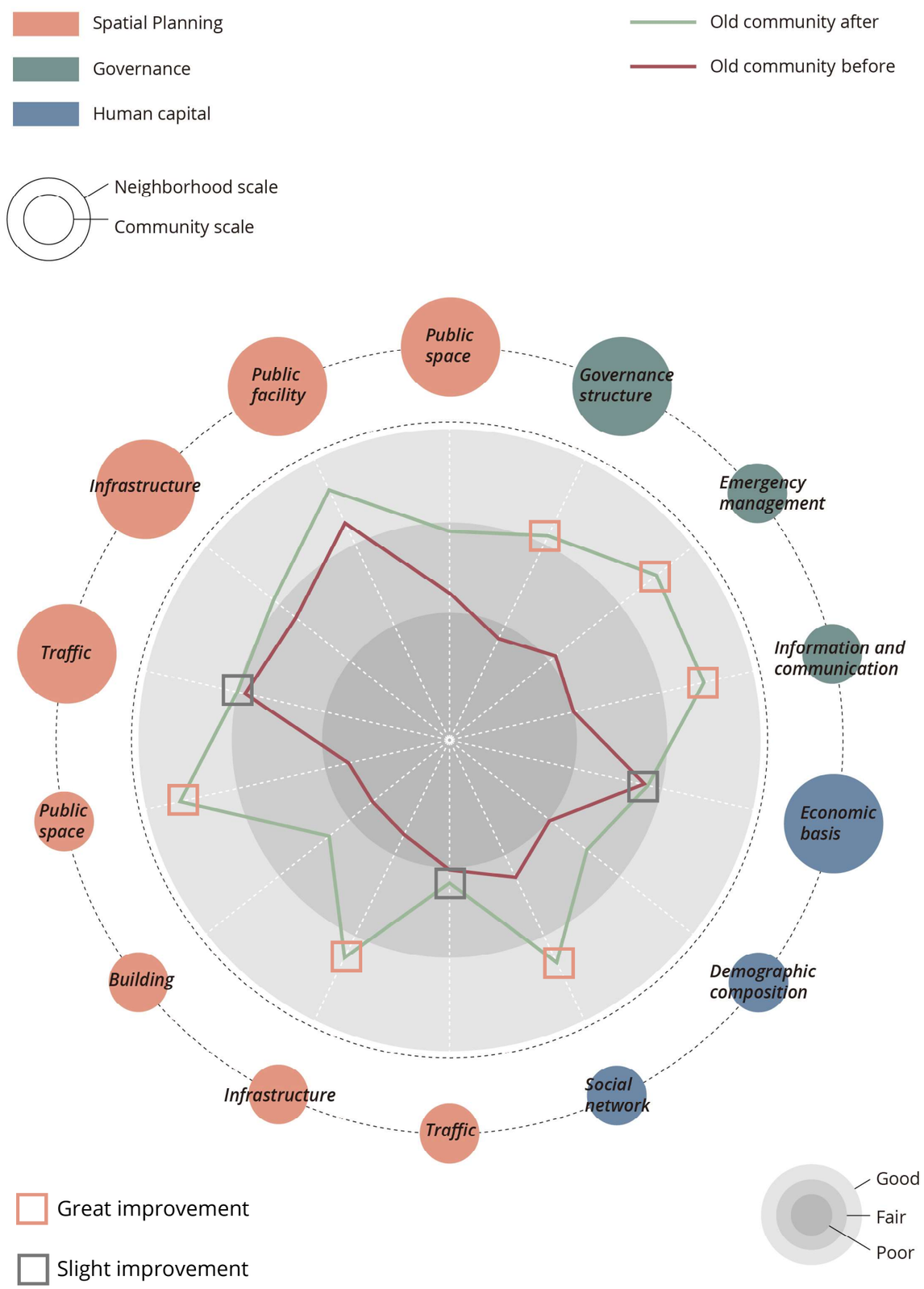


Fig.8.1.1 Reevaluation of community resilience
Source: Author

2 Answering research questions

The outbreak of the pandemic in 2020 took a huge toll on Wuhan. The community has become the focus of society under the pandemic prevention and control. Its exposure of weak coping capacities makes building community resilience from an outbreak perspective urgent and critical. This project aims to establish an integrated strategic framework to improve community resilience and achieve a sustainable and liveable urban environment in Wuhan in the long term.

This project is developed from the main research question:

RQ What can we learn from Covid-19 response in Wuhan to enhance community resilience in the long term by adopting planning strategies?

Taking the community response in Wuhan under the pandemic as a departure point, this project explores a framework for increasing community resilience in the long term, using spatial planning, governance, and human capital as measures, and proposes a toolkit of corresponding strategies: including temporary planning, urban renewal, digital transition, and public engagement, hoping to realize a vision of a liveable and smart future.

The following describes in detail how sub-research questions are addressed.

CONTEXT & PROBLEM

SRQ1: What are the most important Covid-19 community responses and their mechanisms in Wuhan?

SRQ2: What problematic community abilities are exposed by Covid-19 responses?

In Whan, community outbreak response is divided into community closure management, material delivery, and outbreak monitoring. In particular, community closures are relatively self-contained and densely inhabited spaces that are managed as a basic unit to reduce unnecessary outreach activities. The neighborhood is divided into several neighborhood grids according to the actual situation, and the grid manager coordinates the community's preventive work and mobilizes civil society organizations to cooperate (UN-Habitat China et al., 2020).

Communities in metropolitan areas have played a crucial part in China's outbreak control as a key battlefield for closed management. However, poor spatial planning, inappropriate governance, and inadequate human capital exposed in the outbreak control have seriously affected the community's ability to deal with the outbreak, compromised the health and well-being of residents, and caused social isolation.

CONTEXT *1 What are the most important Covid-19 community responses and their mechanisms in Wuhan?*

PROBLEM *2 What problematic community abilities are exposed by Covid-19 response?*

What can we learn from **Covid-19 response** in Wuhan to enhance **community resilience** in the long term by adopting **planning strategies**?

CONCEPTUALIZATION

3 What is the conceptual framework of building community resilience in Wuhan from the perspective of pandemic ?

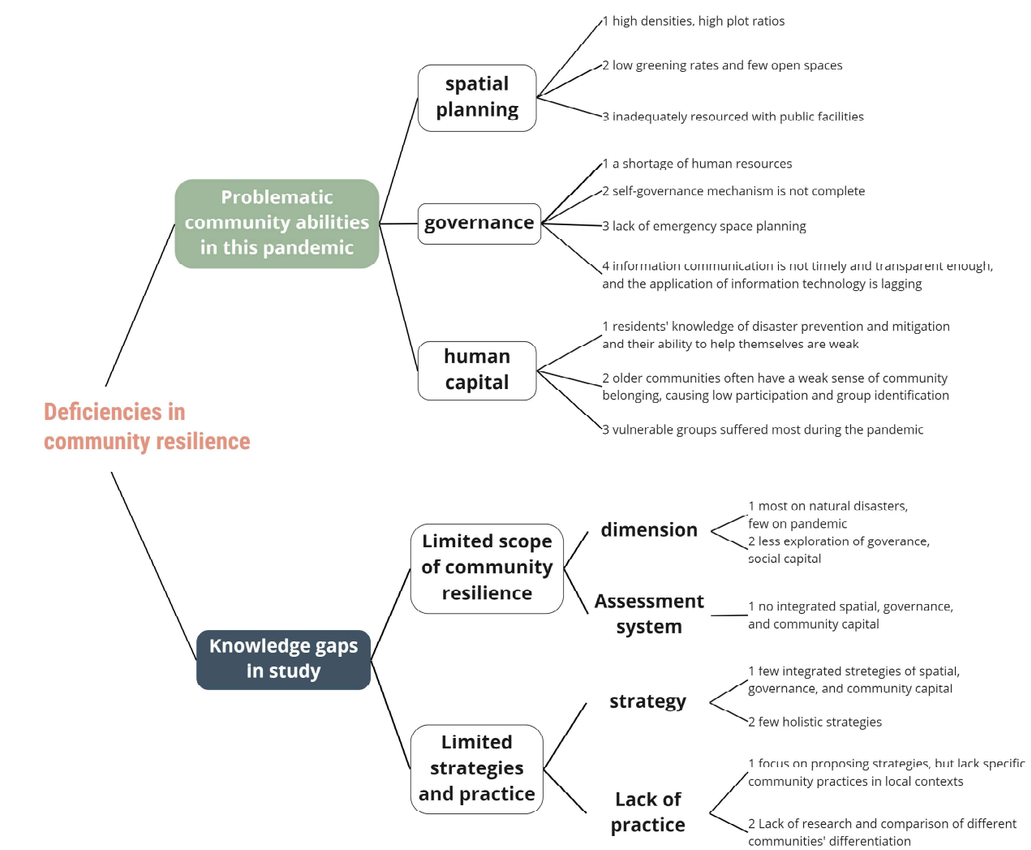
4 What is the analytical framework for measuring pandemic community resilience ?

SOLUTION

5 How can the strategic planning interventions strengthen community resilience through vision?

6 How to improve integration and coordination between planning strategies by design?

CONTEXT&PROBLEM



CONCEPTUALIZATION

SRQ3: What is the conceptual framework of building community resilience in Wuhan from the perspective of pandemic ?

SRQ4: What is the analytical framework for measuring pandemic community resilience ?

Building resilience in communities is a long-term process. First, community resilience is as-sessed through the preparedness and emergency response phases. Once the weak points of community resilience are identified, community resilience is improved through community updates. Until the next crisis occurs, the process is cycled again. Ultimately a vision of a livea-ble and smart future is fulfilled.

The analytical framework needs to pay attention to those indicators that have a greater im-pact on building community resilience in Wuhan in the context of a pandemic. As shown in the diagram to the right, the three most important dimensions are spatial planning, govern-ance, and human capital. This is followed by a division between different scales, that is, neigh-borhood and community. Then there are the primary indicators and the more detailed sec-ondary indicators.

CONTEXT *1 What are the most important Covid-19 community responses and their mechanisms in Wuhan?*

PROBLEM *2 What problematic community abilities are exposed by Covid-19 response?*

What can we learn from **Covid-19 response** in Wuhan to enhance **community resilience** in the long term by adopting **planning strategies**?

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3 What is the conceptual framework of building community resilience in Wuhan from the perspective of pandemic ?

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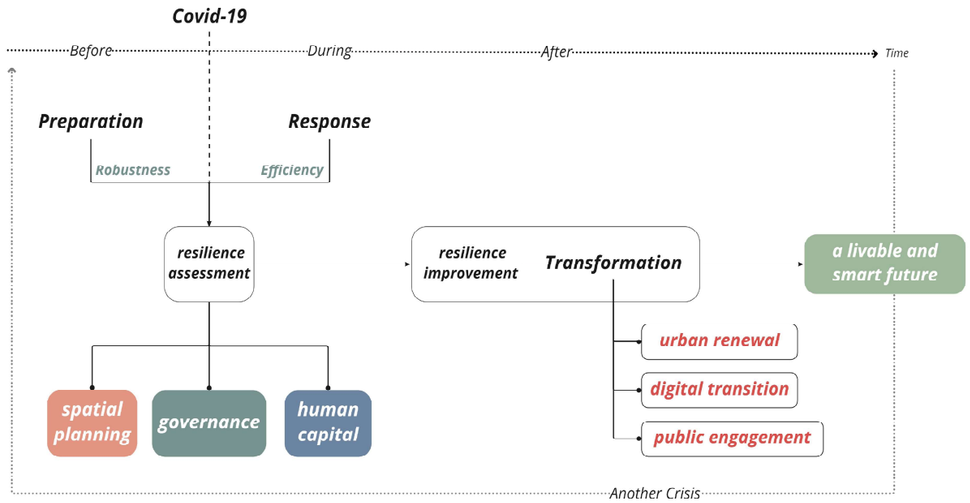
CONCEPTUALIZATION



Dimension	Scale	Primary Indicators	Secondary Indicators
spatial planning	neighborhood	public space	system of open space system of green space system of sports field
		public facility	medical(aging) facility commercial facility comprehensive center
		infrastructure	delivery facility street furniture supporting infrastructure (Parking, water, electricity, communication infrastructure etc.)
		traffic	pedestrian & cycling network
	community	public space	open space green space sports field
		Building	density quality
		infrastructure	street furniture supporting infrastructure (Parking, water, electricity, communication infrastructure etc.)
		traffic	pedestrian & cycling network entrance and exit
governance	neighborhood	governance structure	type of actors degree of engagement
	community	Emergency management	self-governance mechanism emergency plan
		Information and communication	information channels communication activities
human capital	neighborhood	Economic basis	industry structure and diversity
	community	Demographic composition	Aging rate incomes' level residents' knowldege and skills social activities
		Social network	residents' organizations commuity relationships sense of belonging

SOLUTION

SRQ5: How can the strategic planning interventions strengthen community resilience through vision?

SRQ6: How to improve integration and coordination between planning strategies by design?

As shown in the diagram on the right. Based on the previous contextual analysis and lessons learned from worldwide references, a "Livable and Smart Future Vision" was developed to articulate the goals and pathways for strengthening the resilience of Wuhan's communities to emergencies. Six planning principles were then extended from the vision to guide strategy generation.

The Strategy Timeline provides an overview of four main stages with stage milestones, strategies, and key actions. There are four main steps for incremental change.1. Evaluate & plan2. Start transformation3. Continue transformation4. Improve synergy

Then the project-specific upgrading goes through four steps: deep analysis and data gathering, co-design, implementation, and evaluation. In the evaluation part, the rules guide the user to test the quality of the project by combining objective site-specific assessment and subject public feedback.

As far as possible, a diverse range of typology sites are selected, and through local contextual analysis, the appropriate type of strategies is chosen. Then, through local design, a variety of spatial and non-spatial strategies are combined in the same site to examine the effect of the combination on the ground.

CONTEXT

1 What are the most important Covid-19 community responses and their mechanisms in Wuhan?

PROBLEM

2 What problematic community abilities are exposed by Covid-19 response?

What can we learn from **Covid-19 response** in Wuhan to enhance **community resilience** in the long term by adopting **planning strategies**?

CONCEPTUALIZATION

3 What is the conceptual framework of building community resilience in Wuhan from the perspective of pandemic ?

4 What is the analytical framework for measuring pandemic community resilience ?

SOLUTION

5 How can the strategic planning interventions strengthen community resilience through vision?

6 How to improve integration and coordination between planning strategies by design?

SOLUTION

Human-orientation
Meet the needs of different groups
Focus on the changing needs of different periods
Human scale design

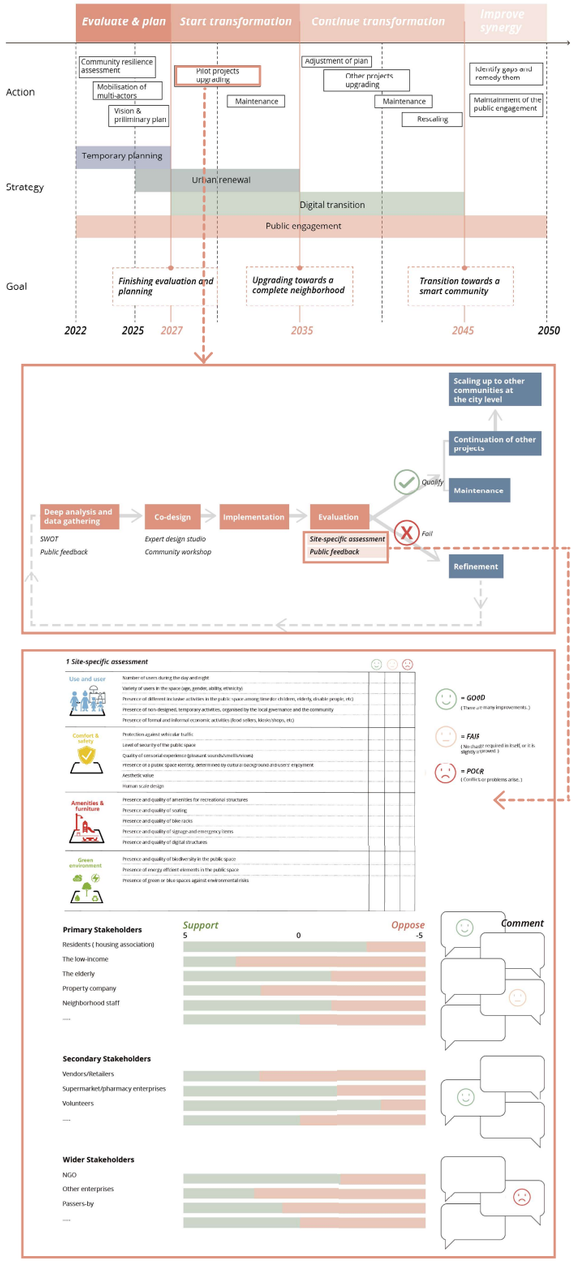
Innovation
Adopt advanced technology
Enhance links between virtual services and real space
Combine online and offline services

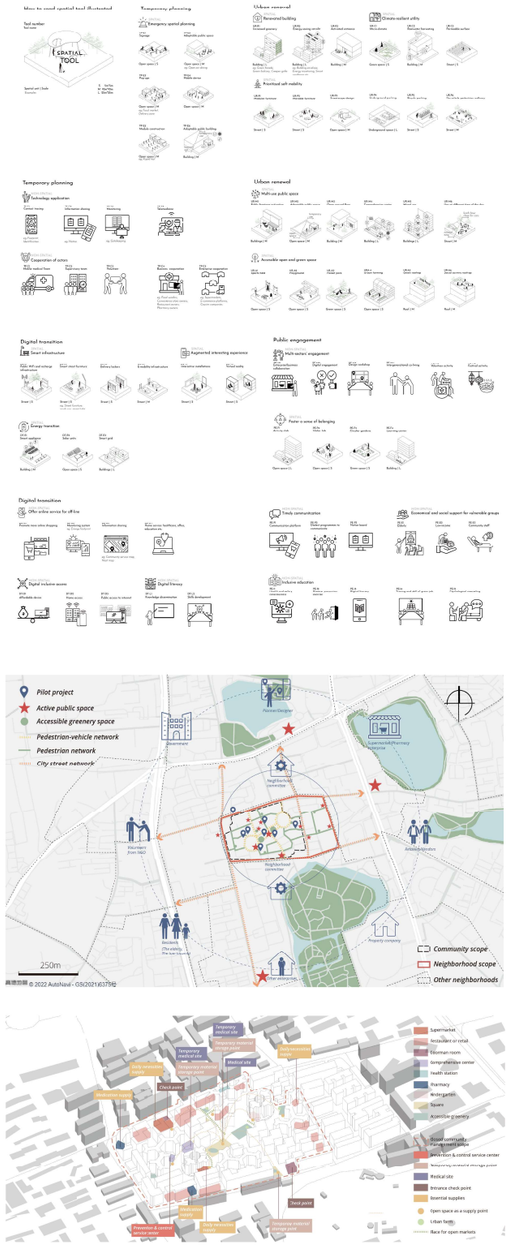
Inclusion
Encourage the public engagement
Support all community groups

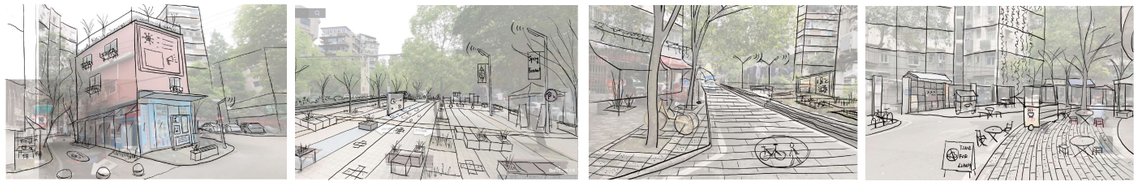
Intelligence
Encourage standardization
Customize to local context

Ecologization
Design multi-functional open green space
Design for both human and ecosystem

Green transition
Promote green building and energy
Advocate sustainable lifestyle







3 Reflections

3.1 Urbanism and scientific&social relevance

Research by design

The research and design in my project are closely integrated, and the process is not linear but intertwined and incremental.

In the beginning, I did comprehensive research to discover general problem fields. Then, through literature review and context analysis, specific points of concern were identified, and a conceptual framework was built up.

By putting up with the vision design, more research on case studies was needed to generate logical and effective strategies for enhancing community resilience. Those strategies got contextualized and tested by local design projects. Also, during the process of application, more detailed investigations were necessary for further refining the design to the real situation on the ground.

The advantages of this approach are that every step is evidence-based and there is a dynamic interaction between design and research. What's more, research by design helps me both to envisage the future and to implement strategies in the field to check the feasibility.

Relationship between project, studio and urbanism

The theme of my graduation project is the enhancement of community resilience in the context of the Wuhan community.

A community is the smallest living unit of a city and part of the urban system. So, my master track Urbanism covers my research topic. At the same time, the study of Urbanism provides a multidimensional and quantitative-qualitative approach to political, cultural, social, and economic research to help me understand cities and communities in the context of the Chinese pandemic through the analysis of urban systems.

My studio Planning Complex Cities focuses on achieving sustainable urban environments through spatial planning and governance. This also fits with my approach and goal of community resilience building. This studio highlights the importance of integrating spatial strategies and governance strategies. At a large scale, my projects use a unified vision to guide and integrate strategies across dimensions; at the local scale, design is the integrated approach, which tests the validity of strategies on the ground.

Scientific relevance

The research highlights three scientific values in the discourse.

First, it expands the dimension of community resilience research. At present, community resilience research in China is still in the exploratory stage and mainly focuses on disasters such as earthquakes and fires. Moreover, the assessment of community resilience is complex and unfocused. This paper focuses on the measurement and enhancement of pandemic community resilience and combines the usual situation with the pandemic situation, broadening the research scope.

Second, it explores the linkage of research fields. Few domestic research fields on community resilience involve human capital, human capital, etc. This paper integrates governance, spatial planning, community capital, and other components of community resilience, and uses design to integrate these fields, exploring the interrelations and integration possibilities of different fields.

Third, it can bridge the lack of local practice. Much of the research on community resilience in China has emphasized the formulation of strategies, but little has been done in terms of site-based practice and testing. In this paper, the target sites are selected for design to test the feasibility and effectiveness of the planning strategies.

Social relevance

This project aims to reflect on four main social influences.

The first is its focus on community resilience in the Chinese context of the pandemic. China's success in containing the pandemic to a low level cannot be separated from its unique political, social, cultural, and economic context. For example, China's unique planning paradigm of gated communities, the administrative mechanism of community committees, the self-organized properties of residents, the prevalence of online group purchasing, and so on. All these constitute community resilience in the Chinese context and are worth studying.

The second is that it improves the community's ability to respond to pandemics and reduces public health crises, improving urban environmental sustainability. An outbreak of the virus seriously affects the normal life and work of residents, not only posing a threat to physical health but also causing psychological stress. If community resilience is maintained at an appropriate level, i.e., communities have sufficient resources with flexible governance mechanisms, the negative impact of a pandemic will be mitigated.

The third point is that it reduces inequality and enhances social inclusion. Vulnerable groups such as the elderly or the poor are more vulnerable to the pandemic due to their low education or mobility. Similarly, workers who are overworked during the pandemic need social assistance due to a lack of manpower and low public participation. Social assistance for vulnerable populations is implemented through integrated spatial, governance, and human capital planning strategies to achieve social cohesion.

Finally, there is limited predictability of future black swan events. Summaries and derivations based on historical experience often fail to predict the occurrence of a black swan event such as the current Covid-19 outbreak. Future waterborne epidemics may occur, and it is also possible that epidemics may occur in conjunction with snowstorms and flooding. These unpredictable events can have a more continuous impact on an already complex urban system. But the significant thing is that humans are adaptable creatures, and we can use what we know to prevent potential future threats.

3.2 Ethical considerations

Ethical considerations

First, the specificities of China's political, social, and cultural history, etc., cannot be ignored in the study. The prevalence of enclosed communities and the promotion of collectivism and trust in the government have led most residents to consciously comply with the government's strict rules for the prevention of pandemics in enclosed communities. This is very different from the Western climate of resistance to prevention and control policies. But these contexts also make prevention and control more dependent on top-down administrative control, and other diverse actors are not motivated to participate actively. So, this issue needs more critical study.

Then, I found that the spontaneous measures taken by the community are inseparable from the local environment of the community, which is very complex. In terms of the community's characteristics and its built environment, old communities with high population and mobility are particularly vulnerable during the pandemic.

Finally, I found that the extent of staff vulnerability in the pandemic was underestimated by the public. In addition to the regular low-income and elderly groups, overworked staff members also suffered tremendous psychological and physical torture. Society should also give them more care and policy encouragement.

To address these challenges, I would think more dialectically. For example, I will consider similar socio-cultural contexts when referring to strategies. Another example is that I would consider diverse groups in terms of their well-being.

3.3 Transferibility

The transferability of the project

In general, this project focuses on urban upgrading with the theme of community resilience, using the new crown as a starting point. It is hoped that it will increase the capacities of communities to cope with instability and ensure people's lives.

The results of this project are a resilience evaluation framework for the community, a strategy toolkit, and a process for taking a community from vision to local design. The resilience evaluation framework will be of value to other domestic communities. The Strategy Toolkit, with its extensive reference to examples from around the world and its wide variety, will have a wider application. Finally, the in-depth design of a designated community can inform the mechanisms of community planning to design implementation.

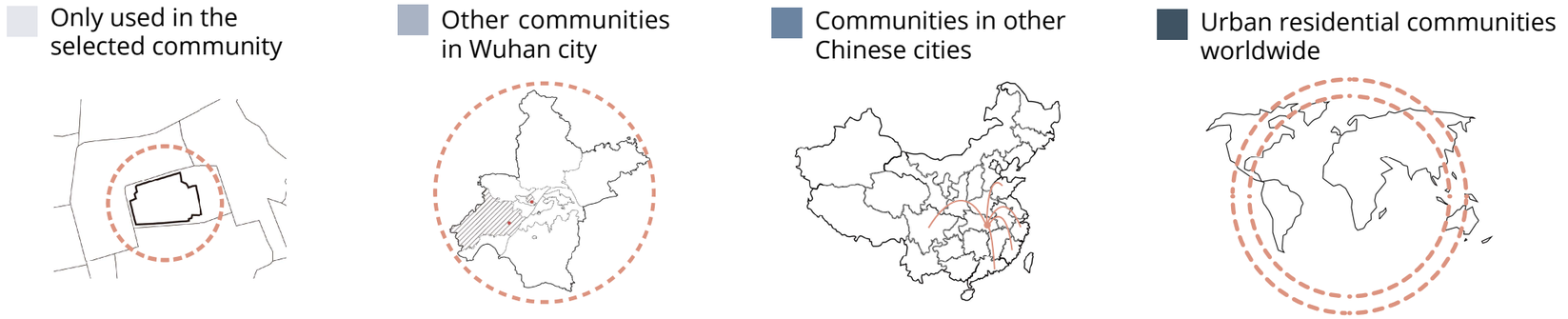


Fig.8.3.1 The reference value of the overall results
Source: Author

3.4 Limitations

Limitations in the research

First, it is difficult to obtain data for the period of the outbreak. The pandemic information is time-sensitive. Because the outbreak period has passed, many temporary measures have been canceled, for instance, spatial measures or self-organized group has disappeared.

Second, it is difficult to obtain community-scale, location-specific data. News coverage often contains general community responses that do not specify the specific location of the community. Even for the same community, there is a lack of news records with more dimensions and over a longer period. Also, publicly available geospatial data in the country is not as abundant as data from the Netherlands. Much of the data is not publicly available, and even if it is, it has a lagging quality.

Thirdly, I was unable to conduct field visits and interviews because of the restrictions of the pandemic.

In response to these challenges, I try to gather as much information as possible from different sources, such as news reports, essays, documentaries, etc. At the same time, thanks to the help of my parents at home, I can learn about the recent situation in the field and get photos of real field trips.

However, the project still has some unsatisfactory aspects.

Firstly, due to time constraints, this project broadly divides Wuhan's communities into old and new ones, and in the end, only one community was selected for the in-depth design. However, even for older communities, there are many typologies in Wuhan, so this study lacks a more comprehensive, comparative analysis and research.

In addition, due to the large number of indicators involved in community resilience, it is difficult to balance the qualitative and quantitative approaches to assessment. Ultimately this project has chosen to be evaluated qualitatively due to the huge amount of data and the difficulty of obtaining it, among other reasons. There is potential to continue to explore quantitative indicators in the future to make the evaluation more objective.

4 Further research

Until the project ends, covid-19 is still active worldwide in many variants, and its impact on the world will persist for decades. The uncertainty of future outbreak variants, in addition to the possibility of other black swan events, determines that research on community resilience will be a dynamic and changing field that requires constant exploration. This project has been developed from existing literature, so there is much room for exploration as new ideas are discovered.

First, community resilience relies to a considerable extent on social resilience. Shanghai is recognized as a city with well-developed urban infrastructure and a wealth of economic and cultural activity, but the recent recurring serious outbreak in Shanghai and the series of humanitarian secondary disasters that have resulted have made me realize the extent to which the collective resilience of the public is important. Social resilience is intimately linked to the cultural, economic, and political factors of a country and should be studied with a more holistic and dialectical mindset.

Secondly, this report proposes a vision and strategy for a smart future based on the current global trend of digital development but does not explore too much the impact of technological development on the way people live, produce and work. For example, drone delivery, robotic services, smart logistics, and so on will greatly improve the convenience and satisfaction of people's lives. At the same time, these will also influence the spatial layout of cities.

Therefore, there is still a lot of space for me to imagine and investigate the topic of community resilience in terms of governance, digital transformation, and public engagement. I will remain open and positive to keep learning and exploring.

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Appendix Appendix 1 Strategy toolkit reference

Temporary planning

https://globaldesigningcities.org/covid-19-resources-center/#english

Credit: Eric Romero/PMSCS

São Caetano, Brazil

São Caetano installed hygiene stations near transit stops.

Credit: AP Photo/Themba Hadebe

Lenasia, South Africa

South Africa expands testing locations with quick-build tents and spread out waiting areas in Lenasia, south of Johannesburg.

Credit: Justin Sullivan/Getty Images

San Francisco, CA, USA

A sanctioned tent encampment for people experiencing homelessness in San Francisco provides physical distance markers for tents and amenities.

Credit: Jain Weraphong

Kalaw, Myanmar

In Kalaw, paint was used to mark vendor stall locations in the marketplace, separating vendors and allowing customers to shop safely.

Credit: NACTO-GDCI

Chicago, IL, USA

Chicago's Broadway Street transformed into a public space for pedestrians, using parking lanes as outdoor seating space for restaurants.

Credit: @demescope

Milan, Italy

Milan has designated outdoor dining areas by repurposing parking spaces.

https://globaldesigningcities.org/covid-19-resources-center/#english

Figure 1. "Human parking spaces" in Mission Dolores Park in San Francisco, May 2020. Photo by Natasha Chu.

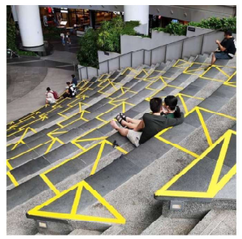


Figure 2. Seating has been carefully marked in public areas to promote safe distancing in Singapore. Photo by Emeric Lau.

Figure 2. Corona Plaza, Queens, June 2019. The Coronate festival. Photo Credit: Marcin Ballvor and the Queens Museum.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8015371/

Table 1

Technology deployment and functions to improve participation, transparency and social connectedness during COVID-19.

Functions	The Type of Technology	Example of Cities Applied These Technologies	Opportunities
Open sharing with citizens about the spread and management of COVID-19	Mobile apps	Seoul	UpCode is making its platform available for others to re-use in other contexts. Retweeting content from other city agencies Predicting outbreaks through interpreting and analyzing social media contents by AI
Sharing Health records and making available for public enforcing social distancing	TraceTogether app The Boston Dynamics Spot robot	Singapore, New York, London, Tel Aviv	
Increase the preparedness and real-time responses	"Crush Aedes Totally" (CAT)	Penang	
Public communication and engagement	Twitter	Atlanta, WDC	
Using social media to interact with public	WhatsApp	Johannesburg	
For social communication	Facebook	Philippines	
To predict spread of disease	AI	The US cities	

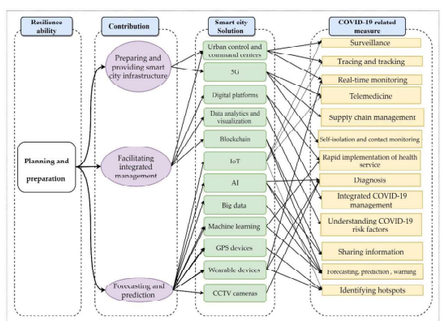
Table 2

Technology deployment and functions to improve the physical and mental health of residents during COVID-19.

Functions	The Type of Technology	Example of Cities Applied These Technologies	Opportunities
Mass location tracking of citizens	Digital epidemiological investigation	Tel Aviv	track down potential contacts of infected individuals The improved facial-recognition system allows better tracing and
Temperature measuring through cameras even with face masks, for potential detection	Next-Generation Artificial Intelligence Development Plan	Wuhan, Shanghai, Beijing, Tokyo	
Self-quarantined Patient monitoring for recording changes in symptoms	"Self-quarantine Safety Protection" smartphone app	Seoul, Singapore	
To promote digital health equity	Telemedicine	New York	
Tracking online shopping products to make assurance	Coronavirus Clearance Certificate (CCC) based on blockchain technology,	Birmingham	
Using dashboard to			

Open in a separate window

https://www.mdpi.com/2071-1050/13/14/8018/htm



https://www.smartnation.gov.sg/covid-19/covid-19-tech

Speed and Accuracy of Contact Tracing

Community Preparedness and Confidence

Flow of Verified Information

Economic and Social Support

Urban renewal

https://www.arup.com/perspectives/publications/research/section/its-alive-future-of-tall-buildings

Mobile expandable street canopies

Accommodating social events / Preston, UK

These 2-storey mobile canopy structures can be cycled into position by up to 10 cyclists and expanded to a length of 12 meters with a 10-metre span to cover city streets and pavements, revitalising underused public spaces and streets for people instead of cars. 'The People's Canopy' was originally designed for the city of Preston, Lancashire, as a means of revitalising declining public spaces in the city centre. Over a period of three days the canopies hosted events and linked underused and disconnected spaces.

Traditional music centre

Adjustable facade and ground floor / Muharraq Island, Bahrain

Office Kersten Geers David Van Severen designed a pair of cultural centres in Bahrain as part of the country's urban regeneration project. They chose to renovate an existing house, to add a community space and design a centre to host traditional music performances. The stand-out feature is its adjustable steel mesh curtain façade that can be lifted to open up the music center to the public and to bring back music to the streets. The permeability of the façade helps render the Dar as a strong cultural institution.

Flexible walls

Multipurpose and shared spaces / Kanagawa, Japan

Aki Hamada Architects designed partition walls that slot into tracks in the floor and ceiling, and can be adjusted to create different enclosures and spaces: for example entirely open plan and column free, or into multiple smaller compartments or rooms. The exterior walls of the building are also adaptable, with an outer layer of semi-transparent steel panels and a transparent inner layer of removable glass panels. The highly-flexible design of the space not only allows a variety of community uses, but also encourages people to engage in its arrangement and preparation.

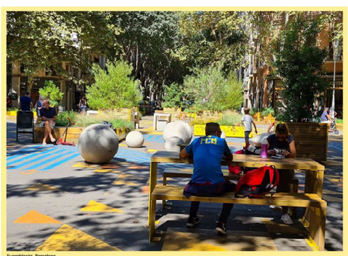
https://www.arup.com/perspectives/publications/research/section/green-and-thriving-neighbourhoods

Barcelona

Building climate resilience

ROOF REFURBISHMENT COMPETITION, BARCELONA

Barcelona is running the 'Second Green Roofs Competition' In the first round, forty-six shortlisted projects were granted EUR 1,000 to carry out a preliminary feasibility study. A further ten projects have been selected and will be award up to EUR 100,000. Submissions from residents are prioritised and can include owners groups from flats and other shared building typologies. The first competition launched in 2017 not only increased the amount of green space by 6,600 m², but also added solar panels and wind turbines, new rainwater collection facilities and installations for wildlife such as ponds for amphibians, insect hotels, bird boxes, and an aquaponics system.



Superblocks, Barcelona

Case studies 3

Tactical urbanism

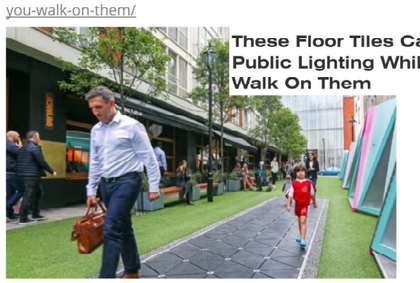
PRIORITISING PEDESTRIANS AND CYCLISTS, BARCELONA

The Superblocks Programme is a transformative vision for the entire city making spaces and streets greener. It gives priority to pedestrians and cyclists by closing streets to through traffic and introducing tactical urbanism interventions. In 2016, the City implemented its first Superblock in Poblenou, including temporary street furniture, reversible painted ground signs, and mobile tree planters. The pedestrian area increased by 80% and the area occupied by cars reduced by 40%. New children's playground areas were created and the green area was increased by 91%. There was a 58% reduction in vehicles. In the meantime, the number of active economic activities in the ground floor increased from 65 to 85 helping to revitalise the area.

TEMPORARY BIKE PARKING, GURUGRAM

Gurugram, India, ran a bike-for-car parking pilot, with each parking space replaced with secure racks for 10 bikes. Modelled after the country's car-free 'Raahgiri Days', the pilot will be replicated throughout the City.

https://popupcity.net/observations/these-floor-can-power-public-lighting-while-you-walk-on-them/

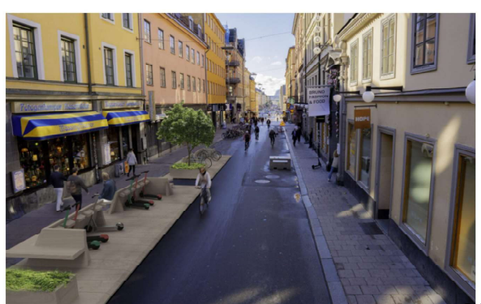


These Floor Tiles Can Power Public Lighting While You Walk On Them

https://gehlpeople.com/projects/public-life-survey-wuhan-china/

https://www.urbanisten.nl/work/roofscapes

https://popupcity.net/observations/welcome-to-the-x-minute-city/



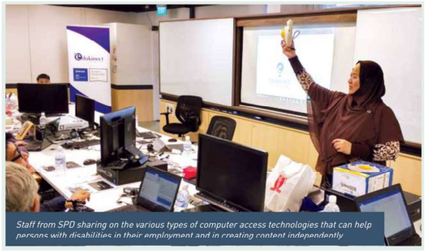
A single module can be a meeting place for neighbours or an event venue, a parcel pick-up point or a parking area for bicycles. Image — ArkDes

Digital transition

https://www.mci.gov.sg/en/portfolios/digital-readiness/digital-readiness-blueprint
https://www.mci.gov.sg/en/portfolios/digital-readiness/get-digitally-ready

Equipping seniors with basic digital skills under IMDA's Silver Infocomm Initiative

Volunteers providing one-on-one assistance to seniors with their mobile phones at the Digital Clinic at L³@Radin Mas: Your LifeLong Learning Journey event



Staff from SPD sharing on the various types of computer access technologies that can help persons with disabilities in their employment and in creating content independently

SG ENABLE
Assistive Technology Fund

The Assistive Technology Fund provides subsidies for persons with disabilities to purchase assistive technology devices to enable independent living.

Applicants can approach their social workers or therapists from touchpoints such as hospitals or Voluntary Welfare Organisations for assessment and assistance on suitable devices.

Successful applicants qualify for a subsidy of up to 90% of the cost of the required equipment, subject to a lifetime cap of $40,000.

WHO IS ELIGIBLE

Singapore Citizens OR Permanent Residents

Certified to have a permanent disability

Have undergone qualified assessor's assessment to determine need and type of device(s)

Household gross monthly income per person <=$1,800

FOR MORE INFORMATION

Home Access

Starting from $9 per month, the Home Access Programme provides eligible households with subsidised fibre broadband connectivity for two years and an option to own a tablet. Beneficiaries can also attend classes to learn how to connect to the internet, download useful apps, and understand other useful functions of the tablet, so that they can be familiar with using the internet and tablet independently and responsibly.

WHO IS ELIGIBLE

Household gross monthly income <=$1,900 OR Per capita monthly income <=$600

At least 1 member of the household is a Singapore Citizen

CitizenConnect Centres

Over 25 CitizenConnect Centres located at various community clubs/centres islandwide aim to provide an easy and convenient means for the public to transact with the Government through the internet. It offers free access to internet-enabled computing devices, with staff on-hand to help citizens and residents access and perform online transactions.

FOR MORE INFORMATION

www.tech.gov.sg/CitizenConnect

info@tech.gov.sg 6211 2100

Wireless@SG

The Wireless@SG programme by IMDA provides free Wi-Fi services in public spaces, in collaboration with venue owners and service providers.

North East Eldersurf Intergen Bootcamp

The North East Eldersurf Intergen Bootcamp by North East Community Development Council and IMDA aims to educate seniors on basic mobile device skills such as connecting to Wi-Fi, taking photos, messaging, and creating an Apple ID or Google account. Seniors will be divided into two classes — iOS and Android classes — to learn effectively. There is also an inter-generation bonding element, where students or youths will be paired up with the seniors to guide them during the workshop.

WHO IS ELIGIBLE

Individuals aged 40 years and above

Residing in North East district

FOR MORE INFORMATION

northeast_cdc@pa.gov.sg

6424 4000

Seniors Tech and Read

Seniors Tech and Read (STAR) is a one-to-one service conducted by volunteers. Participants may get a volunteer to read to them or they can ask library-related technology questions, e.g. how to set up NLB Mobile app, create a myLibrary ID, or set up Wireless@SG. Each session is 45 minutes long.

WHO IS ELIGIBLE

All who are aged 50 and above

FOR MORE INFORMATION

www.nlb.gov.sg/golibrary

enquiry@nlb.gov.sg

6332 3255

https://www.mwinckelmann.com/spacesonwheels

https://momentfactory.com/lab

Public engagement

https://www.arup.com/perspectives/publications/research/section/its-alive-future-of-tall-buildings

Intergenerational co-living

Affordable and community-driven / Deventer, Netherlands

The venue developed a novel use for its empty rooms. They offered students free rooms in return for 30 hours of volunteering per month, helping and engaging with the 160 elderly residents. As well as socialising together, the students help teach them new skills, including how to send e-mails. The scheme has proven to reduce isolation among elderly residents but has also helped tackle the shortage of good-quality, affordable student housing in the city. This low-cost intergenerational model has now been adopted across the country.

https://www.smartnation.gov.sg/combating-covid-19/economic-social-support

COVID-19 Recovery Grant (CRG) application portal

Launched in January 2021, CRG is to continue the support to workers who need some temporary financial help. The Grant focuses on workers in lower- to middle-income households who are presently experiencing involuntary job loss and will be open for application until 31 December 2021.

SupportGoWhere

SupportGoWhere, a LifeSG initiative, provides citizens with a single portal to determine which assistance schemes they would be eligible for. It also has an Eligibility Checker, which lists the schemes that might be available to you when you answer a few questions.

Student Learning Space

When schools had to be closed during the circuit breaker period, MOE tapped on the Student Learning Space (SLS) to ensure that learning could continue while the world battled COVID-19. With the help of SLS, 420,000 students and 33,000 teachers transitioned smoothly to home-based learning.

COVID-19 GoBusiness portal

The GoBusiness platform for business was used as a one-stop portal to provide businesses with information on safe management requirements and to apply to resume operations.

COVID-19 Support Grant (CSG) application portal

Launched in May 2020 to provide temporary support to Singaporeans whose jobs have been affected by COVID-19. The CSG was available until the end of 2020 and approved 98,000 applications since its launch.

CSG was replaced with the COVID-19 Recovery Grant (CRG) with revised eligibility criteria in 2021

https://www.ncss.gov.sg/our-initiatives/the-courage-fund

https://www.mci.gov.sg/en/portfolios/digital-readiness/digital-readiness_blueprint

Dialect programmes like "Happy Can Already!" are effective platforms to communicate important Government schemes and messages, in vernaculars that seniors are comfortable with

Basic Digital Skills Curriculum

The Basic Digital Skills Curriculum equips individuals with basic digital skills so that they can use their mobile devices for greater social connectivity and convenience. These skills align with common everyday activities such as searching for information online, communicating through emails or chats, making transactions or e-payments online, and accessing digital government services. The curriculum also includes other messages on cybersecurity and discernment, to help raise awareness on staying safe in a digital world.

Those interested to pick up the basic digital skills can check out the one-day SkillsFuture for Digital Community training which is offered at selected Silver Infocomm Junctions.

FOR MORE INFORMATION

www.imsilver.sg/bds

info@imda.gov.sg

6377 3800

https://www.thepaper.cn/newsDetail_forward_5986265

https://www.arup.com/perspectives/publications/research/section/green-and-thriving-neighbourhoods

Case studies 1

Socially inclusive

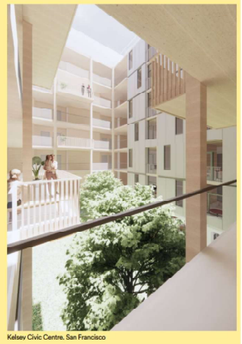
NET ZERO AFFORDABLE HOUSING, SAN FRANCISCO

The Kelsey Civic Centre is a proposal for 102 homes contained within an all-electric zero carbon building. The project was initiated by the city of San Francisco to tackle the lack of affordable housing within the Bay area.

The development site is located at the western end of the Tenderloin neighbourhood where the poverty rate stands at 31%. The homes are intended to be offered to those who are normally excluded from accessing housing, particularly those with disabilities and from low-income backgrounds. Not only are the units intended to be affordable, but the project will include green businesses and training programmes to provide opportunities in the green economy. The development will offer on-site renewable energy generation and storage, as well as other integrated design strategies to reduce the embodied carbon of the site. It is a demonstration of creating an inclusive climate action space.

LOW-INCOME HOUSEHOLD POLICY, JOHANNESBURG

Johannesburg's inclusionary zoning policy, adopted in 2019 compels private developers to set aside 30% of housing units for low-income households when building developments of more than 20 residences, regardless of in which neighbourhood they are in the city. The policy, that also provides incentives through density bonuses, has been a step forward to ensure opportunities to build affordable homes and diversify the mix of homes within all city neighbourhoods.



Kelsey Civic Centre, San Francisco

https://resources.realestate.co.jp/living/how-to-put-together-an-emergency-kit-for-disasters-in-japan/

https://research.hva.nl/en/publications/covid-19-and-its-impact-on-public-urban-space-in-the-netherlands-

Social activities at the community level

Social design initiatives in Osdorp Oost

Circular herb gardens

Makers Lab for children

Community platform 'Wij Amsterdam'

Outdoor painting

Appendix 2 The Site-Specific Assessment Guidelines

Use and user

The dimension focuses on how the space is being used and by whom. A good quality public space is one that is designed to accommodate everyone, where people from all backgrounds can spend considerable time enjoying the space especially the most vulnerable groups. Through this dimension, one can analyse how inclusive the space is through observing the variety of users and the type of activities taking place.

* Mandatory If applicable

Indicators	!	Scale	Sub-indicators / questions
Number and variety of users accessing the public space	*	Site	Number of users during the day
		Site	Number of users during the night
	*	Site	Variety of users in the space (age, gender, ability, ethnicity)
Number and variety of activities observed in the public space among time and space	*	Radius	Amount of mixed use in frontage building
	*	Site	Presence of vacant unit in frontage building
	*	Site	Presence of different inclusive activities in the public space among time (for children, elderly, disable people, etc)
	*	Radius	Presence of non-designed, temporary activities, organised by the local governance and the community
	*	Site	Presence of restrictions rules for specific activities (i.e.: no pic-nic, no play, no biking, etc.)
	*	Site	Presence of social interactions
	*	Radius	Presence of formal and informal economic activities (food sellers, kiosks/shops, etc)

Comfort & safety

This dimension looks at peoples' perception and how they feel, which can have a great impact on their wellbeing and the time they spend in a public space. Places that are well maintained are often perceived as comfortable and safe, while vandalized and poorly-cared spaces can have the opposite effect. Smell, sound, sight, physical condition and the overall identity of a space can be deal breakers for comfort. Perception of safety is subjective, while some might feel safe using a space, others feel threatened by a lack of visibility, concentration of certain groups, lack of activities or historical events.

* Mandatory If applicable

Indicators	!	Scale	Sub-indicators / questions
Perception of safety & level of security of the public space		Radius	Presence of crime related behaviour (robbery, harassments,other crimes, etc)
	*	Radius	Presence of good social behaviours (no drinking, no sleeping, no smoking, no vandalism, etc)
		Radius	Presence of traffic incidents (historical records)
		Radius	Presence of active surveillance elements (CCTV or guards)
	*	Radius	Presence of natural surveillance (number of façade openings facing the public space)
	*	Radius	Level of safety perceived by community during the day
	*	Radius	Level of safety perceived by community during the night
Quality of censorial experience	*	Radius	Presence of pleasant sounds (natural sounds, music, no traffic noise, etc)
		Radius	dB recorded correspond or is less than the maximum recommended dB for the surrounding land use (e.g.: dB < 47 for residential areas)
		Site	Presence of pleasant smell (flowers, bakery, no garbage, no polluted water, etc)
		Site	Presence of pleasant views (façades, vegetations, panoramas, etc.)
Overall comfort using the public space, through maintenance, design and ambiental conditions	*	Radius	Presence of a waste management system
		Site	Quality of cleaning service in terms of frequency and results
		Site	Community attention of keeping a clean environment
	*	Site	Presence of vandalism
		Site	Presence of pleasant wind
	*	Site	Level of temperature for human activities (15-25 C)
		Site	Level of comfort using the space during all seasons
		Site	Presence of covered areas from rain and heat (shades, etc.)
	*	Site	Design quality and aesthetic value of furnitures, façades, pavements
		Site	Presence of community care signs (art, urban agriculture, flowers, etc)
Presence of a public space identity, determined by cultural background and users' enjoyment	*	Radius	Presence of positive reputation regarding the public space and the neighbourhood (no stigma or bias, etc)
		Radius	Presence of cultural aspects/historical events defining the identity of the space
		Radius	Presence of remarkable buildings/physical landmarks (church, fountain, sculptures, etc.)
	*	Site	Amount of people spending time in the space rather than passing through

Green environment

This dimension tackles environmental aspects that can improve health and wellbeing of the residents. Green spaces provide a balance between development and nature and it has become more and more sought after in dense cities. Well-designed public spaces with adequate green coverage and water management can have a great impact on air quality and reducing noise pollution as well as reducing heat and temperature. Trees, grass and other green vegetation provide wildlife habitat, prevent soil erosion, and support adaptation to and mitigation of the effects of climate change.

* Mandatory If applicable

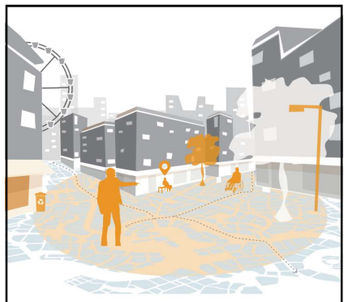
Indicators	!	Scale	Sub-indicators / questions
Presence and quality of biodiversity in the public space	*	Radius	Ratio of green coverage
		Radius	Conditions of greenery in terms of maintenance
		Radius	Variety of biodiversity (trees, flowers, etc.)
		Radius	Presence and variety of fauna
		Radius	Quality of air in terms of co2 and particulate (measured)
	*	Radius	Perception of air quality from the community
Environmental and community resilience		Radius	Presence of waterbodies (rivers, lake, etc.)
		Radius	Quality of water in terms of pollution
	*	Radius	Presence of environmental risks (flooding, erosion, soil degradation)
		Radius	Resilience of the community against risks and hazard
Presence of energy efficient elements in the public space		Radius	Presence of solar or censorial power elements (social lighting, automated irrigation, etc)
	*	Radius	Presence of recyclable waste bins
		Radius	Presence of composting
		Radius	Presence of rain water collector or water filtering system

Amenities & furniture

Amenities and furniture are the features that make public spaces more attractive. This can include, but is not limited to, facilities to play, rest, eat and drink as well as amenities such as lighting, waste bins and toilets amongst others. This dimension looks at their availability, distribution and quality condition. Amenities and furniture should also be inclusive, catering to the needs of the different groups within the neighbourhood.

* Mandatory If applicable

Indicators	!	Scale	Sub-indicators / questions
Presence and quality of lighting	*	Radius	Presence of natural lighting
	*	Radius	Presence of artificial lighting
		Radius	Quality of light source, in terms of quantity, design and distribution
		Radius	Quality of illumination power (50 lux)
Presence and quality of amenities for recreational structures	*	Radius	Presence of inclusive recreational structures for outdoors activities (playground, sports, etc.)
		Radius	Quality of recreational structures in terms of dimensions, design and location for children and disable people
		Radius	Level of use of recreational structures
Presence and quality of seating	*	Site	Amount of primary or secondary seating (benches, mobile chairs, stairs, etc.)
		Site	Quality of seating in terms of dimension, design, material and location
		Site	Level of use of seating elements
Presence and quality of waste bins	*	Site	Amount of waste bins
		Site	Quality of waste bins in terms of design, dimensions and location
		Site	Level of use of waste bins
Presence and quality of bike racks	*	Radius	Amount of bike racks
		Radius	Quality of bike racks in terms of design, dimension and location
		Radius	Level of use of bike racks
Presence and quality of signage and emergency items	*	Radius	Amount of signage
		Radius	Quality of signage in terms of design, dimensions and location
		Radius	Level of use of signage
		Radius	Presence of emergency facilities (fire extinguisher, defibrillators etc.)
		Radius	Quality of emergency facilities in terms of conditions and location
Presence and quality of water and toilets facilities		Radius	Presence of drinkable water sources facilities
		Radius	Quality of water sources facilities in terms of quantity, design, and distribution
		Radius	Level of use of water sources facilities
		Radius	Presence of public toilets
		Radius	Quality of public toilets in terms of quantity, design location and accessibility for PWD
		Radius	Level of use of public toilets
	*	Radius	Presence of drainage system



Public space site-specific assessment

Guidelines to achieve quality public spaces at neighbourhood level

PUBLIC SPACE PROGRAMME

UN HABITAT FOR A BETTER URBAN FUTURE

TWELVE URBAN QUALITY CRITERIA

LOCATION:

= YES
= IN BETWEEN
= NO

Protection	**Protection against traffic and accidents.** Do groups across age and ability experience traffic safety in the public space? Can one safely bike and walk without fear of being hit by a driver?	**Protection against harm by others.** Is the public space perceived to be safe both day and night? Are there people and activities at all hours of the day because the area has, for example, both residents and offices? Does the lighting provide safety at night as well as a good atmosphere?	**Protection against unpleasant sensory experience.** Are there noises, dust, smells, or other pollution? Does the public space function well when it's windy? Is there shelter from strong sun, rain, or minor flooding?
Comfort	**Options for mobility.** Is this space accessible? Are there physical elements that might limit or enhance personal mobility in the forms of walking, using a wheelchair, or pushing a stroller? Is it evident how to move through the space without having to take an illogical detour?	**Options to stand and linger.** Does the place have features you can stay and lean on, like a façade that invites one to spend time next to it, a bus stop, a bench, a tree, or a small ledge or niche?	**Options for sitting.** Are there good primary seating options such as benches or chairs? Or is there only secondary seating such as a stair, seat wall, or the edge of a fountain? Are there adequate non-commercial seating options so that sitting does not require spending money?
	Options for seeing. Are seating options placed so there are interesting things to look at?	**Options for talking and listening/ hearing.** Is it possible to have a conversation here? Is it evident that you have the option to sit together and have a conversation?	**Options for play, exercise, and activities.** Are there options to be active at multiple times of the day and year?
Enjoyment	**Scale.** Is the public space and the building that surrounds it at a human scale? If people are at the edges of the space, can we still relate to them as people or are they lost in their surroundings?	**Opportunities to enjoy the positive aspects of climate.** Are local climatic aspects such as wind and sun taken into account? Are there varied conditions for spending time in public spaces at different times of year? With this in mind, where are the seating options placed? Are they located entirely in the shadows or the sun? And how are they oriented/placed in relation to wind? Are they protected?	**Experience of aesthetic qualities and positive sensory experiences.** Is the public space beautiful? Is it evident that there is good design both in terms of how things are shaped, as well as their durability?