

# Research on Future Community Public Space Design based on Chinese traditional community culture

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**Abstract:** When the urbanization process enters the inventory optimization stage, the concept of smart city and smart community becomes the means to solve the problems in the process, and the de-real estate, the transformation of old residential areas and the application of emerging technologies become the key development direction of community construction. In 2019, Zhejiang Province first promoted the Future community project to build a new type of urban functional unit based on the basic principles of humanism, ecology and digitalization, and nine major scenarios including neighborhood, education, health, entrepreneurship and architecture. Break through the city-level application of smart community and other related concepts, and focus on the front-end community units with more practical significance. This paper summarizes the new theories and technologies of the research of frontier community and community public space at home and abroad. The development of the future community is systematically sorted out, and the spatial structure, key and difficult problems to be solved in the future community public space are analyzed, so as to provide design strategies for the practical operation of future community projects.

**Keywords:** future community, new city, public space, smart community.

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## 1. Introduction

Community refers to an area with certain social cohesion based on interdependence. The common consciousness and close social interaction among residents was first proposed by German sociologist F.Tennies in his book *Community and Society* published in 1887. The 2016 edition of the Code for Planning and Design of Urban Residential Areas (China)<sup>[1]</sup> stipulates that residential areas can be divided into three levels according to the number of residential households or population size, namely residential areas, residential areas and clusters, with each level having a standard control scale. It can be seen that this definition is stipulated from the scale of residence, which is a naming method taken out of management quantification. Standards for Planning and Design of Urban Residential Areas (China) (2018 edition)<sup>[2]</sup> defines urban residential areas as areas with relatively concentrated distribution of residential buildings in the city, referred to as residential areas. The new standard is no longer according to the classification standard of residential area, community and group, but divided into 15-minute living circle residential area, 10-minute living circle residential area, 5-minute living circle residential area and living neighborhood. It can be seen from the revision of norms that residential areas pay more attention to people's living space and behavior, break through the constraints of administrative boundaries, and build a more livable living environment.

At the end of the 20th century, "digital Earth" developed digital city and digital community. Due to the maturity of spatial geographic information system (GIS) technology, remote sensing, global positioning system (GPS), geographic information system (GIS) and other technologies can be used for three-dimensional description of urban data. Digital community is the basis of digital city, which uses sensing, digital information processing and communication technology to realize community information presentation<sup>[3]</sup>. Subsequently, intelligent community<sup>[4]</sup> began to integrate the regional concepts focusing on broadband infrastructure construction, such as wireless city. Connect the city with high-speed broadband wireless network to achieve access to information services at any time and anywhere, and the community develops to the direction of intelligence. Wireless broadband network is known as the "fifth common infrastructure" after water, electricity, gas and transportation. smart community<sup>[5]</sup> is proposed under the background of building smart city<sup>[6]</sup>, and it is also the development result based on digital community and smart community. Smart city is the inevitable trend of urban informatization development. Smart community refers to a community that uses the integrated application of new generation information technologies such as the Internet of Things, cloud computing and the Internet to provide a safe, comfortable and convenient intelligent living environment for community residents and forms a new management form based on information and intelligent social management and service<sup>[7]</sup>. From the initial concept of smart community to the formal proposal of IBM in 2009, countries around the world have made preliminary practice and exploration (Table 1). The components of smart community are mainly divided into five aspects. The first is the data source of smart community -- infrastructure, including the facility layer, network layer and perception layer. The second is the comprehensive information service support platform, which is based on the urban public information platform and public basic database to provide

government services, public services and business services. Embody the characteristics of "wisdom" and as the core of wisdom community; Thirdly, smart application involves three levels of community management, operation and service. Fourthly, smart community targets users as neighborhood committees, owners' committees, property companies, residents, market service enterprises and related social organizations. Fifth, build a guarantee system for the whole system and specify corresponding policies, systems and standards. The construction of smart community includes data reception, storage and processing, exchange and integration, data application and the guarantee of the whole system<sup>[8]</sup>.

**Table 1**

Time	Country	Plan
2006	South Korea	U-Korea
2006	Singapore	iN2015Plan
2009	The United States	IBM Smart City
2009	Japan	i-japan2015
2010	The European Union	European 2010
2010	China	Smart City
2015	India	Smart City Mission

## 2. Future urban community research theory

### 2.1 Evolution of future urban space design

There are various discussions on future cities and communities in the world, emphasizing that the future is digital, complex disciplines, integration of media and reality, and self-sufficiency. These theories enrich the meaning of "future" and provide different perspectives and focus on building future communities.

As early as Mitchell published "CITY OFBITS" and "E-topia" in the 1990s, he applied digital imagination to the real world and proposed the future imagination of digital city and digital community with the concepts of electronic citizen and electronic venue. The architecture and city are placed in a new background to reconstruct, imagine and create digital media and environment, that is, a network world that links all human beings together with electronic media<sup>[9]</sup>. Communities and homes will be restructured, more work can be done electronically, and the space requirements for homes are constantly changing; The evaluation standard of community has changed. The quality of a community is no longer determined by the local physical conditions, economic environment, cultural appeal and cost. The electronization has reduced people's need for workplaces and service facilities to be near. Compared with the physical public space, the construction of virtual public space enables more freedom of speech and supplements actual meeting through virtual communication. Because our social communication is not a "zero-sum game", electronic communication can not only improve our overall ability of social communication, but also change the rules of the game in a complex way<sup>[10]</sup>.

The virtual community environment should not be regarded as a temporary phenomenon and allowed to develop or even be avoided. It is actually changing our community environment and social relationships and ways, with both good and bad results. Itoban's key appeal is that we should not wait for technological innovation, not just to lay digital broadband lines and electronic devices, but to create our ideal community-led technology development and application.

Adapting to the virtual community environment is the gradually evolving new urban science, which has emerged gradually in the past decade and become an interdisciplinary subject integrating urban computing, artificial intelligence, augmented reality, human-computer interaction and other directions, bringing the possibility of change for urban research and urban planning and design. Urban cognition is generally a system theory, which has experienced static cognition of location theory and regional science until the complex movement that arose in the 1980s, using the concept innovation of complex, nonlinear and unbalanced system compared with simple, linear and balanced system. The more representative of urbanism is Michael. The New Science of Cities by Michael Batty<sup>[11]</sup>. Urban science is an interdisciplinary subject, which studies different urban problems based on the research results of multiple disciplines<sup>[12]</sup>. Therefore, it can be seen that the new urban science has two important characteristics, dynamic evolution and complex science.

### 2.2 Future urban space design theory

Spatial intervention, Place Creation and Digital innovation<sup>[13]</sup>. In view of the impact of disruptive technologies on living, working, transportation and leisure, Long Ying expanded Michael's theory. The new data, new methods and new technology concepts proposed by Baty in New Urban Science emphasize that research should also focus on new urban phenomena and problems of "new" urban research; At the operational level, digital innovation at the technical level is integrated with spatial intervention at the physical level and place construction at the social level, and the foreseeable future urban space model is actively explored." Our destiny

is to build the future, not sacrifice it." Rather than just discussing and imagining the future, Carlo Ratti's team is based on the idea of "shaping the future" with technical means, hypothesizing future scenarios, studying the consequences of scenarios, and sharing the resulting ideas extensively to promote open dialogue and debate to achieve or exclude a "future". Research projects such as "Waste Streams" and "Sonic cities" of Perceptive City Lab demonstrate how high and new technologies change our lifestyle in cities, and explore the future intelligent development direction of architectural design, infrastructure, urban public space and so on <sup>[14]</sup>.

**2.3 Development of digital network of future urban space design**

"The Internet has changed life, but it has not changed the city." Guarialte, the chief urban designer of Barcelona City Hall in Spain, starts from the understanding that the city is still a city composed of the network. He proposes the self-sufficient city -- that is, in order to make the livable multi-level system self-sufficient. You need to move towards self-sufficiency at every level: layers of self-sufficiency in districts, neighborhoods, buildings, in order to create a self-sufficient city within a self-sufficient regional framework where everyone is connected through an information network. The city of the future will not have a bustling center and an open periphery, but a lot of interconnections. The neighborhoods that make up the city. Self-contained urban networks are made up of countless nodes and connections between them. Any functional object or building that carries human life is a functional node in the urban network. According to the different number of people, it can be divided into one room (1 person), one floor (10 people), one building (100 people), one block (1000 people), one community (10,000 people), one urban functional area, city and region, etc. See Figure 1. These nodes are then connected by the infrastructure composed of information network, water circulation system, material circulation system, energy network, population movement and green system as a network. Self-contained cities emphasize three aspects in public space design: citizen participation, application of emerging technologies such as information and communication technology, and re-naturalization of cities <sup>[15]</sup>. Guariat's argument tries to show another direction for the future. Urban nodes such as blocks and communities can realize self-circulation of internal systems. This mode is more flexible and adaptable to changes, transcending the centralized system of industrial society and better coping with the possible decline of cities.

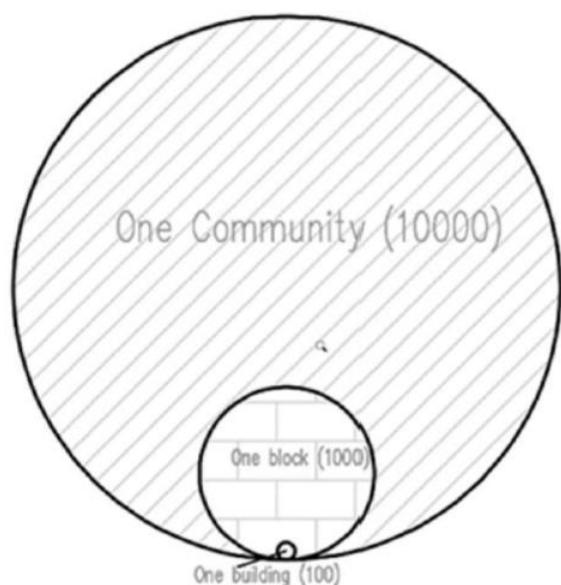


Figure 1 Schematic diagram of the future urban area

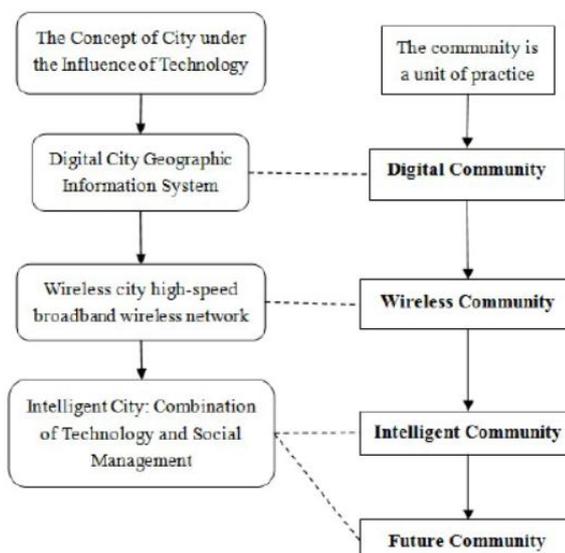


Figure 2 Concepts related to future communities

**3. The Sinicization of future urban communities**

There are connections and differences among digital community, smart community and smart community. The construction goal is to use current technology to promote the improvement of community services, with a certain continuity of development and the context of The Times. The difference lies in the fact that when the digital community was proposed, the network had not been popularized, which was mainly to upgrade the information of the manual processing business, and the lack of collaboration and sharing; Intelligent community focuses on the provision of software and information, and realizes information interconnection in a small range. On the basis of the two, smart community utilizes the latest technologies such as the Internet of Things, cloud computing and big data as well as new social governance concepts to emphasize the integrity of the community system (Figure 2).



Figure 3 Future design plan of Xiongan New Area

In 2018, Xiongan New Area will start to build a global leading digital city with deep learning ability, and adhere to the synchronous planning and construction of digital city and real city (Figure 3). Since then, other provinces and cities have also started to build digital cities and digital communities. Digital twinning refers to the technology, process and method of constructing digital objects corresponding to physical entities. Digital twinning must include three necessary parts: physical entity, virtual digital model of physical entity, data and information interaction system between physical entity and virtual model. The third is the essential difference from previous modeling methods. Digital twin cities are based on the extensive application of the Internet of Things, big data, artificial intelligence, block chain and other technical fields in the city level, through the physical city in physical dimension and the digital city in the information dimension to grow together, the integration of virtual and real, to build a real city and a digital city pair Complex systems that correspond to, map to and interact with each other. Digital Lisheng city has three characteristics: realism, iteration and intelligence. The biggest innovation of the digital twin city is the "realism" of the whole process, the establishment of a unified and extensive data source; It has synchronous life cycle and construction time sequence with the physical city and can be constantly updated; Digital Lisheng city is also a calculable "urban laboratory", which can be predicted and verified in the corresponding situation with the physical system<sup>[16]</sup>.

In China, the real estate development mode needs a more healthy and perfect system. At present, the first and second tier cities in China regulate the real estate market through measures such as purchase limit, price limit and loan limit. Therefore, after solving the incremental problem, the ordinary community is not suitable for the higher development requirements of the current society and residents. In the future, communities will try to develop from the perspectives of urban resource allocation, community harmony and the pursuit of ethnic culture. For example, public resources will be effectively utilized through community openness, the government will purchase community services to promote the communication of community residents, and grassroots community service centers will be set up for joint arrangement to emphasize the unique cultural characteristics of each community. So model drivers are an important consideration in the fundamental understanding of future community change. The market is also a factor that cannot be ignored in the future community. At present, there are more and more new economic models, such as sharing economy and Internet economy. Part of the business needs around the community can be met through the Internet, and the community public service supporting gradually presents a development trend of facilitation and miniaturization. Then how the community responds to the changes of the new economic model through design will be an important research question.

Since 2019, China has gradually introduced the construction of future community, which is an attempt of community construction and operation mode with special characteristics in the context and conceptual framework of the current smart community, and has a certain correlation with smart community. "Future Community Pilot Construction Management Measures (Trial)" defines the future community as "a new type of urban functional unit with a sense of belonging, comfort and future", its planning is divided into 50~100 hectares of planning units and more than 20 hectares of implementation units. The implementation projects are divided into two types: reconstruction and renewal and planning and new construction, with the reconstruction and renewal of old residential areas from the 1970s to the 1990s as the main type. The future is the

"realizability" in a limited period of time. In other words, the "future" in the discussion of future community refers to the pursuit of a "better solution" by using the current technology and means.

By November 3, 2022, China had completed the renovation of 166,000 old urban residential areas, benefiting more than 29 million households. We will accelerate the building of complete communities, promote the construction and renovation of cities suitable for aging and children, and systematically create livable environments for the elderly and child-friendly cities. In addition, pilot projects of urban renewal have been carried out in 21 cities, urban physical examination and assessment have been carried out in 59 sample cities, and pilot projects of fire control design inspection for renovation and utilization of existing buildings have been carried out in 31 cities and counties. Its distribution in China is shown in Figure 4.



Figure 4. Distribution of existing building renovation pilot

Future community construction is in the exploratory stage, so it needs to be studied in three aspects. On the one hand, it is the study of the historical development of public space. It sorts out the development of domestic community public space represented by Fengqi Community, and discusses the design characteristics of public space in different stages and modes respectively from the modes of high-rise, multi-storey and low-rise communities. The second is to study the current excellent frontier and future community design, to investigate the domestic community and analyze the international cases of the future community, and to propose the research content and structure of the future community construction in the initial stage from the two aspects of the research strategy of space content and structure, space use mode. The third is the generalization of experience. It is necessary to conduct qualitative and quantitative analysis for different future community programs in Zhejiang Province, and summarize their trends and characteristics from the two aspects of graphic language and numerical guidelines.

#### 4. Conclusion

The research value of this paper lies in sorting out the corresponding theories and research methods of new community public space, and showing the great changes of new community public space imperceptibles.

(1) The research on public space of future community is in the initial stage. It has been less than two years since Zhejiang proposed future community in 2019, and no future community has been built yet. Therefore, the current community design is self-talk, no system, lack of basic information for development, and Zhejiang Province plans to build more than 100 future communities and promote, so the early data collection and systematic arrangement is very precious. On the other hand, the future community is not the star community, the elite community, the concept community, but the general community ready to be promoted, so the design model is not an unprecedented and untested completely innovative utopia, but must have a certain degree of popularization and replication. Therefore, it is of no reference value to compare future communities with complex communities and landmark communities. Instead, it should be compared with ordinary communities under the rapid development mode of real estate in the context of China. The research of future community public space should be carried out in stages and steps. For the current preliminary stage, the exploration of space design is to cross the river by feeling the stones, to investigate the community on the ground, to learn from reference materials, to try to explore in multiple directions, to determine its spatial function and spatial structure, and to innovate the matching operation mode. After the completion of a certain number of practical projects, the space design experience can be summarized and improved through the study and test of residents' life feedback.

Several types of corresponding design patterns can be put forward for macro control, and the possibility and details can be deepened and problems can be solved under the limited direction, finally reaching a more mature stage.

(2) The understanding method of community public space needs to be expanded in the future. In the process of the gradual deepening of the research on future community, it has experienced the change of the context of the research object from "smart community" to "future community", and the change from the qualitative analysis of space to the quantitative index analysis to a certain extent. When big data design shows great possibilities, statistical and quantitative analysis of spatial design index data can make the guidance of data to design more operational.

(3) For the discussion on the design strategy of future community public space in Zhejiang Province, two operational levels of connection-sharing and virtual-real integration are finally determined by combing and studying the previous basic achievements. Connection sharing is an operation of space content in four aspects: open connection, network structure, quantitative guidelines and aggregation function of future community public space. Virtual-real integrated design is more about the investigation, use, operation and participation of public space, including the investigation of the application of digital tools, the integration of virtual-real space design, operation and design of digital intervention. This strategy has operational and guiding significance for design practice.

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