TAKING KPFUI LONDON IDEAL BLOCK AS AN EXAMPLE :

RESEARCH ON DESIGN STRATEGIES OF DAYLIGHT IN HIGH-DENSITY CITIES BASED ON GENERATIVE URBAN DESIGN

TRACK 01: HEALTH AND CITIES

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BACKGROUND

Since 2020, the whole world is threatened by COVID-19, the physical and mental health of city residents has received special attention.

With the rapid process of urbanization in the world, as cities continue to grow at an abnormal rate (about 68% of the population will come from cities by 2050), the concept of "compact city" was put forward in the Green Paper on the Urban Environment as early as 1990. The high density development of the city has become inevitable.

the high-density development of cities has become inevitable. Higher, closer buildings and less public space will lead to a variety of urban problems, the most significant of which is lack of daylight. Daylight is closely related to the physical and mental health of human body.

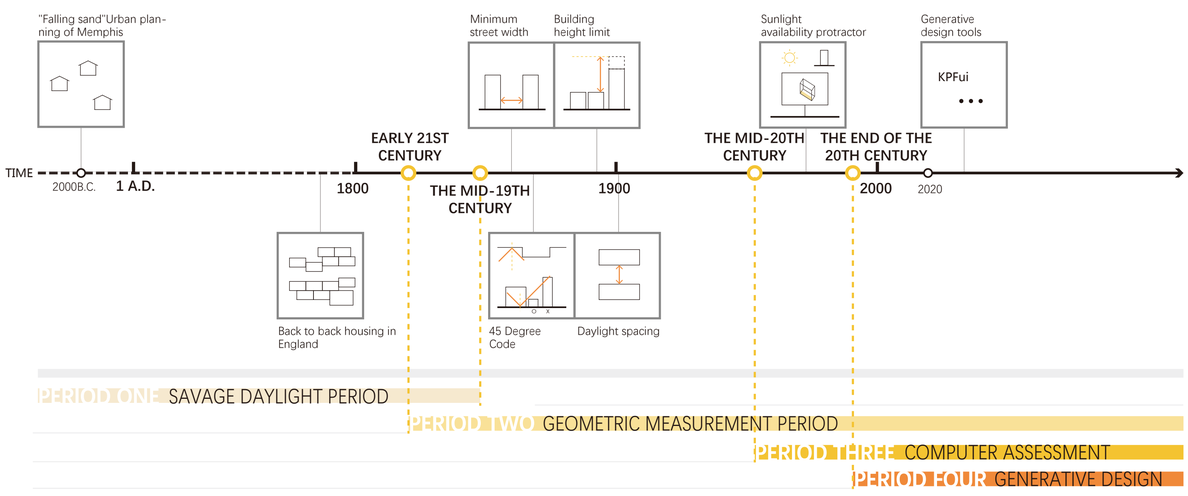
Therefore, it is urgent to find an urban design method that can make good balance between high density and daylight.

This paper summarizes the research on daylight in urban construction history. It has gone through 4 periods. Now it has progressed from the post-design evaluation period to the generative design period. The factors affecting daylight involve three scales: single block, multiple blocks and city scale. By controlling these factors balance density and daylight.

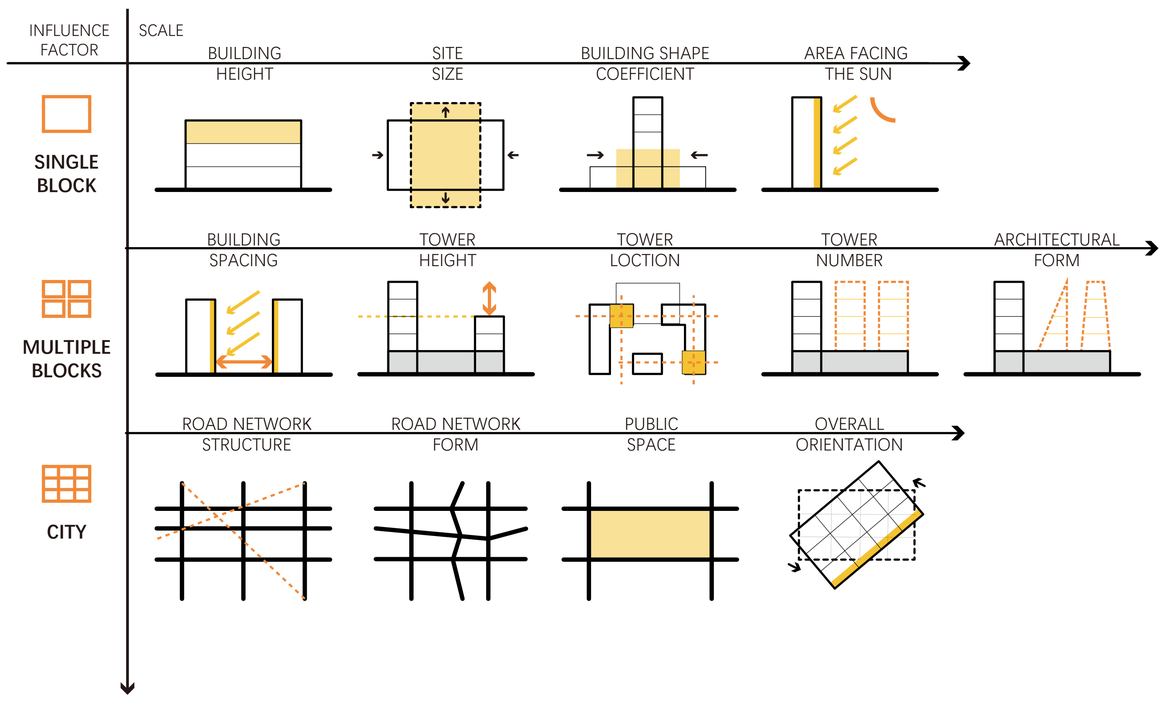
London ideal block on KPF urban design interface (KPFui) is a typical case, which adopts a representative generative design approach. It provides enlightenment for the construction of healthy city in China.

This method has advantages in six aspects: comprehensive dimensions, pre evaluation, flexible results, efficient process, clear display and wide application. In order to deal with the daylight problems caused by high-density city in China, we should first adopt the design process of pre evaluation, and then introduce the intelligent decision-making mode. Last but not least, add a visual form of communication. Although there are limitations in this method, it can help solve more urban design problems in the future.

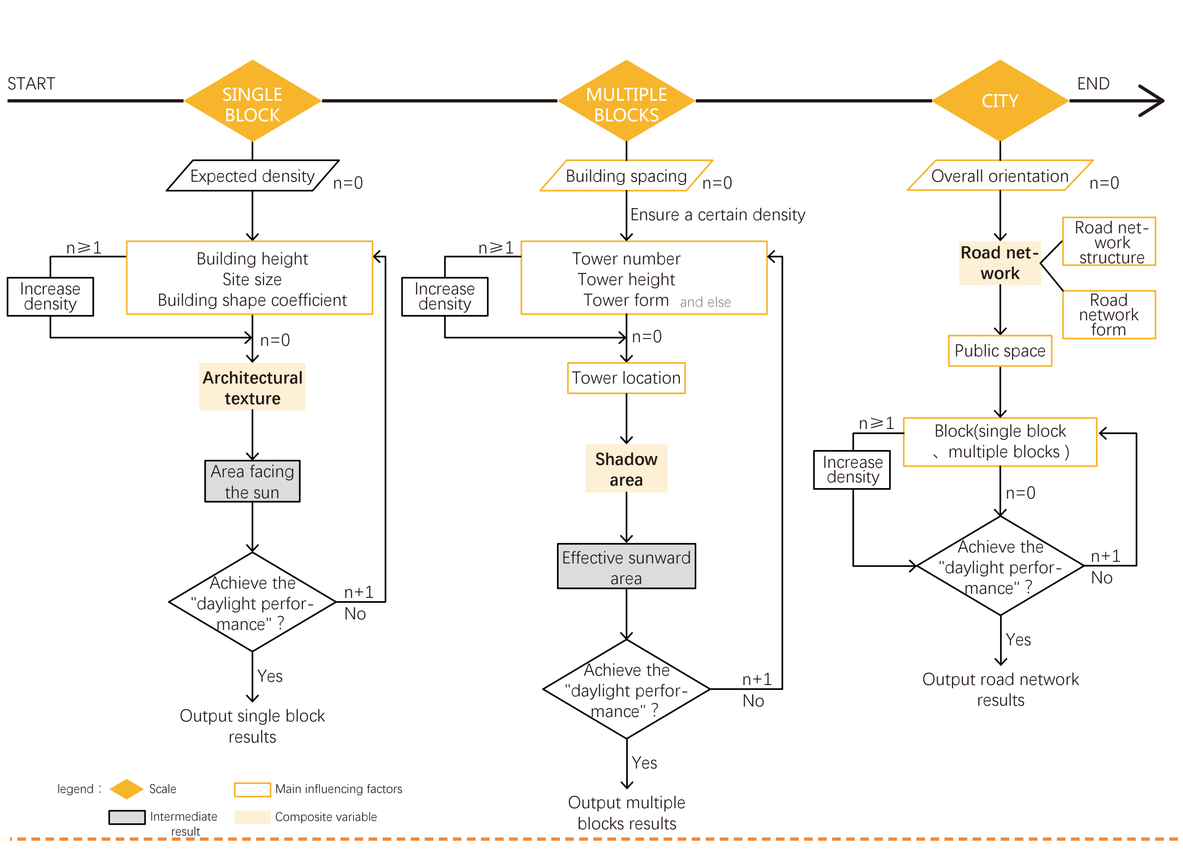
THE HISTORY OF DAYLIGHT RESEARCH
IN URBAN SPACE



INFLUENCE FACTORS AND MECHANISM OF DAYLIGHT
IN HIGH DENSITY CITY OF KPFUI LONDON IDEAL BLOCK

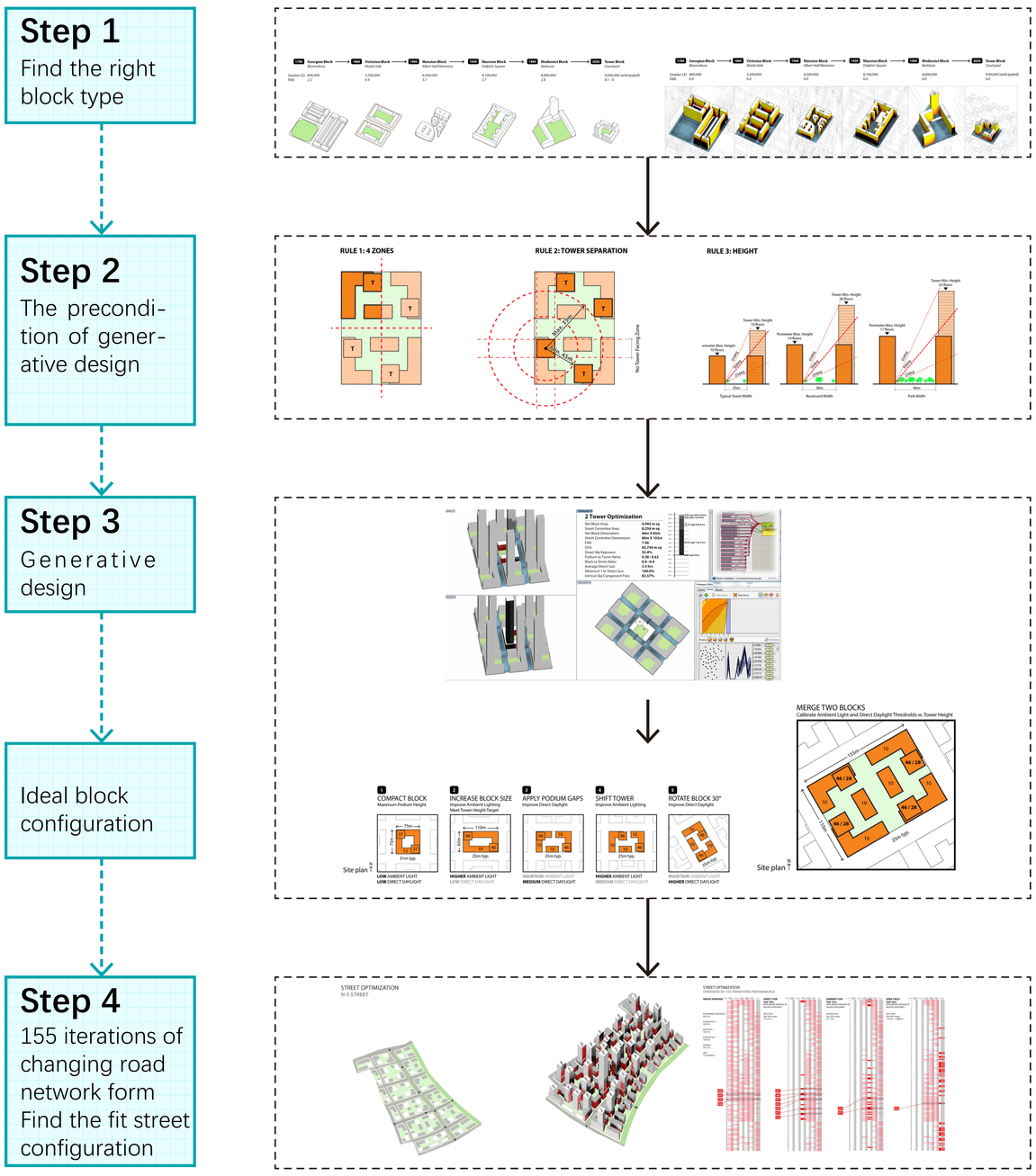


scale 1: the influence of urban texture on the scale of single street block
scale 2: parametric effects of multiple block scale towers
scale 3: the influence of road network and orientation on city scale



ADVANTAGES OF GENERATIVE URBAN DESIGN

- comprehensive dimension: multiple angle evaluation index
- pre evaluation: pre generation design
- flexible results: variable optimal block configuration
- process high efficiency: machine learning and iteration
- clear presentation: visual communication process
- wide application: the principle can be deduced



INSPIRATION FOR CHINA
TO DEAL WITH HIGH DENSITY URBAN DAYLIGHT PROBLEMS

INSPIRATION 1: DESIGN PROCESS OF PRE EVALUATION

Now from incremental planning to stock planning. In the face of urban renewal, more careful assessment is needed. Generative design can be added to urban design as a means of pre evaluation. Explore new urban texture, form the closed loop of "planning design construction operation post evaluation planning" proposed by academician Zhuang Weimin, and build a complete system to guide the generation of scheme. Break through the fixed mode of thinking, find new inspiration to solve the problem of high density and light balance.

INSPIRATION 2: INTELLIGENT DECISION-MAKING MODE

China's high-density areas are generally entrusted by the government, involving a number of institutions and designers to make decisions. Developers pursue higher density, and the government requires both density and daylight. There are many problems in decision-making, such as long decision-making process, multi-level decision-making and inconsistent decision-making opinions. It often takes months or more. And because of subjective factors, it is easy to miss the optimal scheme.

Generative design can be used as a tool to provide intelligent decision-making mode. Integrating the decision-making process, using algorithm to reduce artificial interference through machine learning, and enhancing objectivity and persuasion. Improve the implementability of the program and speed up the process. For example, KPFui helps Hangzhou new town project to make decisions from 7400 alternatives through generative design.

In addition, we should create the urban characteristics of "small block, dense road network, narrow street" under the condition of considering the density of sunshine, instead of a typical experience of a park with tower. Greatly shorten the design time, so that the project can be born in two months, and enhance the advantages of the scheme .

INSPIRATION 3: VISUAL COMMUNICATION FORM

The daylight experience of high-density construction is complex. Moreover, there may be a big gap between the user's feeling and several solutions that meet the standard. Therefore, the opinions of the residents are very important.

So in the future, generative design can be introduced as a means of visual display and applied in public participation. By holding an exhibition of generative design and so on, with the help of its easy to understand design process, it can help communication and promote the wide participation of the public . The urban design mode of social governance based on collaboration and broad participation should be established.