



# Narrative Innovation for Archaeological Sites: A Study on the Design of the Light-and-Shadow Theater for Kaifeng's "City Upon City" Site

Dang Li

Shanghai Fengyuzhu Culture Technology Co., Ltd., Shanghai 200436, China.

**How to cite this paper:** Dang Li. (2026) Narrative Innovation for Archaeological Sites: A Study on the Design of the Light-and-Shadow Theater for Kaifeng's "City Upon City" Site. *Journal of Humanities, Arts and Social Science*, 10(5), 584-589. DOI: 10.26855/jhass.2026.05.013

**Received:** March 25, 2026

**Accepted:** April 28, 2026

**Published:** May 29, 2026

\***Corresponding author:** Dang Li, Shanghai Fengyuzhu Culture Technology Co., Ltd., Shanghai 200436, China.

© 2026 by the author(s).

This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution-NonCommercial-NoDerivatives (CC BY-NC-ND) license, which permits non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited and is not modified or adapted.

<https://creativecommons.org/licenses/by-nc-nd/4.0/>

## Abstract

The "City Upon City" site in Kaifeng is an excellent archaeological site of the former capital of China. Five layers of cities are built underground to record the floods of the Yellow River, dynastic changes, and the repeated destruction and reconstruction of the city. The traditional site display is not very good at showing the stratified layers underground or presenting them in a scene. "Parallel Kaifeng" historical multidimensional space-time theatre at the Yellow River Suspended River Culture Museum will be the research object of this paper, and engineering practice, interdisciplinary research, and field investigation will be carried out to analyze the design concept, spatial construction, technical route, and narrative system of an interpretive model-based light-and-shadow theatre. According to the idea of "unchanged urban central axis", five groups of independent and connected lifting models will be coordinated by a 360° panoramic LED system. The synchronisation error of the lifting system with the images should be less than 50ms; a story of "growth - prosperity - inundation - decline - rebirth" will be created, and archaeological authenticity, exhibition art, and technological innovation will be combined. A new model of "archaeological site + immersive performance + digital display" has been put forward in this paper to solve the problem of display for superimposed sites, and an actual case study and theoretical basis for the Yellow River cultural heritage have been provided.

## Keywords

City upon City site; Yellow River suspended river; site display; mechanical model; light-and-shadow theater

## 1. Introduction

### 1.1 Research Background

Yellow River Culture is one of the main parts of Chinese culture. Because of the diversion of the Yellow River and the Yellow River Basin, Kaifeng has been developing in a "City-upon-City" form. Geographically speaking, it has formed a scene of "a suspended river above ground," and a capital civilization of "the river above the city and the city layered below" has taken root here. Archaeological investigation shows that in Kaifeng, five levels of cities have been built one after another above each other about 10-13 meters underground, and the urban central axis has not changed for a thousand years; therefore, the site is an excellent carrier of Yellow River culture. "City upon City" is not only a physical superposition but also a cultural superposition, and it is an outstanding material carrier of Yellow

River culture.

Although many studies have been carried out so far on immersive displays, there has been no research in China yet on dynamic model-based interpretive displays for deeply superimposed capital-city sites. Due to its own reasons, the site has the problem of “rich archaeological achievements but weak public awareness”, and traditional exhibitions cannot show the dynamic process or the spirit of civilisation. With the development of immersive technology, site activation and performance have become new directions for the construction of Yellow River cultural displays and museums. The exhibition Area will be about 11,000 square meters, serve as a new symbol of cultural experience in Kaifeng, and also be a leading carrier of Yellow River culture and a new call sign for North Kaifeng.

## 1.2 Research Object and Importance

This paper is about the “Parallel Kaifeng” interpretation model of light and shadow theatre at the Yellow River Suspended River Museum. First, there is immersive theatre in China that is around 1,102.7 square metres, has the theme “City upon City,” and has lift models and panoramic light and shadow. As the head designer, I led the planning, design, and execution of the theatre. This paper has extended the theory of site display, created a trinity visualisation paradigm of “archaeological strata - dynamic model - panoramic performance”, increased the scope of research on museum exhibitions, refined the value-interpretation system of sites, and provided a reference for similar displays.

## 1.3 Research Methods and Framework

Case studies, engineering practice, interdisciplinary research, comparative studies, and fieldwork will be used in the paper to carry out on-site investigations at the Zhouqiao site in Kaifeng. It integrates archaeology, urban history, water conservancy history, exhibition design, and digital media to study the design logic, technical path and value-realisation mechanism of the theatre. The Structure is as follows: Introduction  $\to$  Site Value and Display Dilemma  $\to$  Overall Design Concept  $\to$  Spatial and Narrative Construction  $\to$  Lifting Model System  $\to$  Panoramic Light-and-Shadow and Digital Content  $\to$  Technological Integration  $\to$  Innovations and Insights  $\to$  Conclusion.

## 2. Value Interpretation of Kaifeng’s “City Upon City” Site and the Dilemma of Traditional Display

### 2.1 Core Values

The five main values of the site are archaeological, historical, scientific, cultural, and educational. First of all, there is a rich archaeological value; there are clear underground five-layer superpositions, complete strata, a stable layout, and an unchanging central axis over a thousand years, and it can provide material evidence for research on the planning of ancient capitals. Second, it has a long history of about 2,000 years and can be called an “underground Twenty-Four Histories” (Chen, 2023) because it has seen the rise and fall of various dynasties. Third, in terms of science, it can show us how the Yellow River siltation has changed urban construction over time and provides a good representative case for interdisciplinary research. Fourthly, in terms of culture, it carries the spirit of the Central Plains civilisation and is an emblem of the Chinese people’s disaster recovery. Fifthly, in terms of education, it has drawn from many cultures and is an important place for cultivating patriotism and ecological civilization.

### 2.2 Stratigraphy and Pattern

Archaeological exploration and excavation have confirmed, as shown in “Archaeological Discoveries and Research on Kaifeng’s City upon City” (Liu, 2018), that there are several superimposed layers. At a depth of 10-13 meters, there is Warring State Wei Danyang City, which is the capital of Wei and the core of the Honggou water system. At 8-10m is Tang Bianzhou City, which was rebuilt by Li Mian and laid out in the later stage. At 6-8m is Northern Song Dongjing City, and there are triple city walls and four rivers in the capital. At 4-6m is Jin Bianjing City, which has the Northern Song layout but is prone to flooding. At 2-4m is the Ming-Qing Kaifeng City.

The middle line has not changed at all. Northern Song Imperial Street, Ming-Qing Zhongshan Road, and the current urban axis of Kaifeng are still here, and the spatial pattern has not changed. This not only reflects the ancient Chinese capital-planning concepts of “centrality as dignity” and “harmony between heaven and humanity” (Liu, 2018), but it will also be the main clue for this exhibition design.

### 2.3 Limitations of Traditional Displays

Previously, the main ways to display the information were graphic panels, static sectional models, small-scale exhibitions of artifacts, and traditional videos. The above are general and scattered methods. They cannot show the general situation of layered strata and historical sequence intuitively, nor can they fully explain the development logic of urban rise and fall, flood inundation, iterative renewal, and rebirth.

### 3. Overall Theater Design Concept

The theatre is the first interpretative panoramic light-and-shadow theatre in China based on “City upon City”, and according to novelty search, there are currently no other similar interpretative theatres in China that combine the five independent lifting city models and 360° panoramic LED technology; both the technology and the form are original. In line with the authenticity of archaeology, based on narrative logic and through the use of advanced technology to focus on the public experience, a main exhibition area combining site displays and other functions has been built for the project. Based on the concept of the “unchanging urban central axis”, it covers all aspects related to spatial organisation and has three levels of superimposed meaning: relics, culture, and spirit.

Through these means, the theatre has made the buried, invisible, and highly specialised archaeological information into a sense of place, allowing people to feel the construction process of the ancient city and learn about its history. Therefore, the Design does not just present technology in the form of a show; instead, it is a translator for academic research results and the general public.

Slogan: Step into the painted scroll for a moment; dream back a thousand years at a glance (Qingming Riverside Landscape Garden, 1998).

### 4. Exhibition Space Design and Narrative Logic

#### 4.1 Spatial Layout and Visitor Flow

The theatre is on the second floor and is double-height. The Capacity of each is 120. It has a prelude Hall, a main theatre, and an interactive extension Area, and it is in the shape of a vertical envelope. Visitors will be led to the Gate of Time and Space, the main exhibition area, and the interactive Experience Area in order to leave.

#### 4.2 Five-Stage Narrative Structure

The core theme is: The city changes, the river changes, and the people change, but the central axis remains the same; prosperity and ruin, rise and fall, but the spirit of civilisation is eternal.

The five stages of the story in the theatre are as follows:

**Table 1. The five stages of the story**

| Stage      | Dynasty/Period                             | Core Event  | Model Lifting State                        |
|------------|--|---|--|
| Growth     | Warring States Daliang; Tang Bianzhou      | Capital establishment, canal excavation, urban rise | Rising layer by layer                      |
| Prosperity | Northern Song Dongjing                     | Capital city peak and bustling markets              | Fully displayed                            |
| Inundation | Jin, Ming, Qing                            | Yellow River breaches and city destruction          | Sinking and submerging layer by layer      |
| Decline    | War and siltation periods                  | Sediment burial and civilizational silence          | Hidden at low level                        |
| Rebirth    | Ming-Qing reconstruction to modern Kaifeng | Post-disaster rebuilding and pattern continuity     | Stably displayed, central axis highlighted |

## 5. Interpretive Lifting Model System Design and Archaeological Restoration

### 5.1 General Introduction

The five independent lifting city models, the mechanical lifting system, the synchronous control system, and the lighting-rendering system are the main supports. It can move the model, image, and sound effects synchronously at the millisecond level, and the position error of the model is no more than  $\pm 10$ mm.

### 5.2 Archaeological Restoration of City Models

The five groups of models are strictly in line with the archaeological reports and documents. Warring States Daliang City rebuilds the Honggou water system and shows a picture of water flooding in Daliang. Tang Bianzhou City is rebuilding its city. Dongjing City in the Northern Song Dynasty rebuilt the three city walls and added a picture of the four rivers in its capital. Jin Bianjing City and Ming-Qing Kaifeng City are also included. All the outer frames of the models are  $6\text{m} \times 5.5\text{m}$ , and the size of each dynasty is adjusted according to the scale of that city.

### 5.3 Mechanical Lifting System

The five models can rise and fall independently or together in various combinations according to the different periods of history. The lifting stroke is a simulation of strata and the interpretation process of cities being flooded; it is a vertical space-time comparison. The public can see that the cities have sunk layer by layer due to repeated flooding and then “grown” again layer by layer. The system is in line with the pictures, light, and sound.

## 6. Panoramic Light-and-Shadow Space and Digital Content System

### 6.1 Panoramic Immersive Space

The theatre has a five-sided CAVE panoramic LED system on the four walls and the ceiling, but it does not have one for the floor; therefore, there are no borders, and it is fully immersive. Attributes of the main LEDs: Pixel Pitch P2.5, Brightness  $500\text{ cd/m}^2$  and Colour Gamut Coverage of DCI-P3. The picture has a continuous and harmonious quality, and it can feel good.

### 6.2 Digital Content Framework

The content of the story follows the history of “City upon City” and is a 12-minute main film with interactive sections. The time divisions are as follows: 1 minute for the introduction, 2 minutes for each of the five historical periods, and 1 minute for the conclusion; a whole narrative system has been constructed.

### 6.3 Core Film Content

The main thread of the film is Meng Yuanlao’s first-person narration, and it is connected with *The Eastern Capital: A Dream of Splendor*. At the beginning, Meng Yuanlao clarifies the relationship between Menghua Lu and Dongjing Menghua Lu (Deng, 1982), introduces the “City upon City” wonder of Kaifeng, and emphasizes that the central axis is the city’s foundation that gives it cultural style and links all the stories. Then the film will present the historical period in order. After King Hui of Wei moved the capital to Daliang City in the Warring States period, it became a water-transportation and commercial hub, and was later destroyed after Wang Ben diverted water to flood it; thus, it can be seen that water conservancy was related to the rise and fall of the capital. Tang Bianzhou City flourished again due to the convenience of the Sui Grand Canal and became an important link. Northern Song Dongjing prospered in the era of Bian River grain transport and was splendid, but after the Yellow River breach and the Jingkang Incident, it fell into ruin. Jin Bianjing built its imperial city according to the Song system, but it was destroyed in the war and national collapse. In Ming-Qing Kaifeng, the Yellow River approached, and flooding occurred in the city, leading to harm; Qing reconstruction built the city wall we know today, and displayed the spirit of protecting and rebuilding a city. Finally, the film ends by showing that although Kaifeng has been repeatedly destroyed by war and river disasters, it has always been rebuilt on the old site to create the “City upon City” miracle and elevate the themes of family, nation, and culture.

## 7. Technology Integration

The five coordinated systems of the Path of multiple-technology integration are:

**Table 2. The five coordinated systems of the Path of multiple-technology integration**

| Technical System                       | Function  | Technological Maturity |
|--|---|------------------------|
| Mechanical lifting control technology  | Dynamic model interpretation                          |                        |
| LED panoramic display technology       | Immersive enveloping image                            |                        |
| Professional stage lighting technology | Atmosphere rendering and central-axis reinforcement   | Mature                 |
| Surround-sound audio technology        | Sound-image synchronization and emotional guidance    |                        |
| Central control technology             | One-click start/stop, fault monitoring, log recording |                        |

## 8. Project Innovations and Insights

There are many achievements in the design of the exhibition. The main line of history is taken as the base for building an integrated system of archaeology and culture for narration. Set up a sand table, film, and light linkage to build an active visual theatre and solve the display problem of underground sites. It can also be the path to access the archaeological site and other experiences. From practice, it is known that site exhibitions need to have archaeological authenticity and should integrate content for artistic expression and technological application. Large sites should have an all-encompassing story and be presented flexibly; intelligent technology should be used moderately. The model of this project is “led by cultural tourism, supported by academic research and empowered by technology”, and it can serve as an example for other museum projects in the Yellow River cultural tourism areas and capital cities.

## 9. Conclusion

Interpretive lifting models can help us feel the connection of the superimposed strata at the site, ancient city patterns, and history. Taking the constant central axis as the main line of the narrative can turn professional archaeological materials into a form of cultural expression that is easily understood by the public and in line with museum communication logic. The project is an all-weather facility that will integrate archaeological verification, narrative construction, introduction of technology, and establishment of a permanent operating base; thus, it will be an excellent model for museums in the Yellow River Basin.

This project was realised in the new museum; later, it needs to be verified further in the in-situ protected site museums. In the future, Digital Twin technology, augmented reality (AR) overlays, and interactive experiences will be added to increase people’s sense of immersion and the effect of cultural communication for virtual site restoration and personalised guidance at the exhibition.

## References

- Cedro, C., & Matthews, J. (2023). Between light and shadow: The impact of light augmentation on storytelling and audience engagement in urban, commercial and public spaces. *Journal of Pervasive Media*, 8(1), 85-104.
- Chen, J. K. (2023, July 10). Deeply exploring the contemporary value of ancient capital culture. Henan Daily.
- Guo, S., & Zhang, L. (2023, July). How Does Interactive Light Art Intervene in Urban Public Space. In *International Conference on Human-Computer Interaction* (pp. 120-135). Cham: Springer Nature Switzerland.
- Kaifeng Qingming Riverside Landscape Garden. (1998). Promotional slogan for Song-culture tourism [Advertisement]. Kaifeng: Qingming Riverside Landscape Garden Scenic Area.
- Li, Y. (2025). Immersive theatre and cultural-tourism integration in China: a case study of “Only Henan”.

- Liu, C. Y. (2018). Archaeological discoveries and research on Kaifeng's city upon city. Science Press.
- Liu, Q. Z. (2018). The central axis of ancient Chinese capitals and the concept of "centrality as dignity." *Acta Archaeologica Sinica*, (2), 145-162.
- Meng, Y. L. (Song Dynasty), & Deng, Z. C. (Annotator). (1982). Annotated Dongjing Menghua Lu. Zhonghua Book Company.
- Yu, W. (2025). Infrastructure and counter-infrastructure: spatial modernity, cultural narratives, and visual aesthetics in China, 1949-contemporary.