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Urban digital twin - Part 1: Technical reference architecture

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part

1. Structure and drafting rules for standardization documents" Drafting. This document is Part 1 of GB/T 45109 "Smart City Digital Twin". GB/T 45109 has published the following part.

1. Technical reference architecture. Please note that some of the contents of this document may involve patents. The issuing organization of this document does not assume the responsibility for identifying patents. This document was proposed by the National Technical Committee for Information Technology Standardization (SAC/TC28). This document was prepared by the National Information Technology Standardization Technical Committee (SAC/TC28) and the National Urban Sustainable Development Standardization Technical Committee. It is jointly managed by the Committee (SAC/TC567). This document was drafted by: Tencent Cloud Computing (Beijing) Co., Ltd., China Electronics Technology Standardization Institute, China Information and Communications Research Institute, Institute of Technology, Softcom Smart Technology Co., Ltd., Renmin University of China, Huawei Technologies Co., Ltd., Shenzhen Urban Transportation Planning and Design Research Center Co., Ltd., China Mobile Xiong'an Information and Communication Technology Co., Ltd., Beijing May Day Vision Digital Twin Technology Co., Ltd., Chengdu Qinchuan ChinaNet Technology Co., Ltd., Beijing Institute of Architectural Design Co., Ltd., Terry Digital Technology (Beijing) Co., Ltd., Sichuan Jianshan Technology Co., Ltd., China Electronics System Construction Engineering Co., Ltd., China Mobile (Hangzhou) Information Technology Co., Ltd., MCC Wuhan Surveying and Design Engineering Co., Ltd., Engineering Technology Co., Ltd., China Railway Seventh Bureau Group Wuhan Engineering Co., Ltd., Xidian University, Shanghai Municipal Engineering Design and Research Institute (Group) Co., Ltd., Shenzhen Yitu Information Co., Ltd., Tianjin University, Shenzhen Youli Holographic Technology Co., Ltd., Yuance Information Science and Technology Co., Ltd., Henan Provincial Government Big Data Center, China Power Construction Group East China Survey and Design Institute Co., Ltd., China Science Star Map Digital Earth Hefei Co., Ltd., Isa Technology Co., Ltd., Shenzhen Original World Technology Co., Ltd., Guangdong Xinhedao Information Technology Co., Ltd., Shenzhen Institute of Surveying and Mapping (Group) Co., Ltd., Nobikan Artificial Intelligence Technology (Chengdu) Co., Ltd., Baweitong Technology Co., Ltd., Shanghai Jianke Engineering Consulting Co., Ltd., Shandong Benliu Information Technology Co., Ltd., CITIC Construction Co., Ltd., Tianjin Wanfeng Environmental Protection Technology Co., Ltd., Morgan (Zhejiang) Intelligent Chip Co., Ltd., and Shanghai Urban Construction Information Technology Co., Ltd. The main drafters of this document are: Zhang Hongwei, Wang Tao, An Xiaomi, Wang Yaoyao, Peng Gefei, Mei Shujia, Li Jianhui, Dong Nan, Zhang Xiaochun, Cui Hao, Zheng Qingguo, Zhang Yuxiong, Liu Wen, Feng Xiaomeng, Lin Tao, Wang Chenkang, Yao Xinxin, Jiang Lijian, Li Qing, Shao Zehua, Tian Jing, Gao Min, Zhuo Pengfei, Liu Junwei, Wang Xueqiang, Tang Li, Pu Guiyang, Li Rui, Xiang Fumin, Li Teng, Zang Zhonghai, Yao Wei, Gu Xiaoguang, Long Hao, Zhang Pei, Qian Chengyang, Lou Xiaolei, Wang Yansheng, Tang Deke, Huo Chunwang, Wu Shunmin, Jia Haipeng, Liao Yu,

Yang Hongxu, Lu Zhichao, Huang Kefeng, Zhou Peng, Wang Guannan, Zhan Shuyan, Zhang Xun, Geng Xincan, Jiang Zhiping and Zhou Zhefeng.

GB/T 45109 "Smart City Digital Twin" aims to standardize the connotation of urban digital twins and guide the application of digital twin technology in cities. The application in this paper is planned to consist of three parts.

1. Technical reference architecture. The purpose is to establish the technical reference architecture of urban digital twins and standardize the urban digital twin intelligent Requirements for components such as energy infrastructure, data resources, digital engines, digital twin services, security management, and operations management.
2. Data reference architecture. The purpose is to establish a data reference architecture for urban digital twins, focusing on urban digital twin technology. The data resources in the technical reference architecture are given, and requirements for data aggregation, data processing, data sharing, data services, etc. are given.
3. Business Reference Architecture. The purpose is to establish the business reference architecture of the city digital twin, focusing on the technical reference architecture. Digital twin services and applications provide a reference architecture for relevant business application scenarios and business organizational relationships from a business perspective. Among them, the technical reference architecture determines the organizational model and internal relationship between the data reference architecture and the business reference architecture. Smart City City Digital Twin Part

1 Scope

Part 1 of China's national standard for urban digital twins, giving the technical reference architecture. A digital twin of a city is a model kept synchronised with the real thing by live data, used to plan, operate and test changes before making them - closing a road, siting a hospital, simulating a flood. China is building them at scale, most conspicuously in Xiongan, where the digital model was constructed alongside the physical city. The architectural problem is that such a twin is not one system: it draws on cadastral and BIM models, on remote sensing, on IoT sensing, on operational systems from a dozen departments, and it serves applications built by different parties. Without an agreed structure each city builds a monolith that cannot be extended or reused. This part defines the layers - intelligent infrastructure, data resources, the digital engine, twin services, security management and operations management - and their requirements.

This document provides a technical reference architecture for urban digital twins, defining smart infrastructure, data resources, digital engines, digital twins, Service, security management and operation management requirements. This document is applicable to guiding the application and deployment of digital twins in cities, supporting the planning, construction, management, operation, updating, Serve.

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document. For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to This document.

GB/T 37971 Information security technology Smart city security system framework

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 City Digital Twin CityDigitalTwin Mapping, synchronizing, interacting and evolving physical entities, relationships and activities in urban physical and social spaces in digital space Digital representation technology.

Note. Urban digital twins can use data, models, and algorithms as carriers to complete urban simulation, prediction, interaction, and control.

4 Abbreviations

The following abbreviations apply to this document. AR.Augmented Reality CAD. Computer-Aided Design