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Information technology - Digital twin - Part 2: Digital entity

信息技术 数字孪生 第2部分：数字实体

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Table of Contents

1.Scope	1
2 Normative References	1
3.Terms and Definitions	1
4.Abbreviations	2
5.Constituent Elements	3
5.1 Overview	3
5.2 Digital Model	4
5.3 Twin Data	4
6.Construction process	5
6.1 Overview	5
6.2 Requirements Analysis	5
6.3 Data Preparation	5
6.4 Unit Model Construction	7
6.5 Complex Model Assembly	7
6.6 Digital Entity Verification	7
6.7 Digital Entity Correction	7
7 Digital Entity Management	8
7.1 Overview	8
7.2 Data and Model Management	8
8 References	9

Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part

1.Structure and Drafting Rules of Standardization Documents". Drafting. This document is Part 2 of GB/T 43441 "Information Technology - Digital Twins". GB/T 43441 has already published the following parts.

1.General Requirements;

2.Digital Entities;

3.Information Interaction. Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying

patents. This document was proposed and is under the jurisdiction of the National Information Technology Standardization Technical Committee (SAC/TC28). This document was drafted by: Jiangsu CESI Technology Development Co., Ltd., Wuhan Dongyan Smart Design Institute Co., Ltd., and China Electronics Technology Group Corporation. Standardization Research Institute, Shenzhen CESI Information Technology Co., Ltd., Xiamen CESI Technology Development Co., Ltd., China Petrochemical Engineering Construction Co., Ltd. The company, Beijing University of Aeronautics and Astronautics, Sany Group Co., Ltd., Beijing 51Vision Digital Twin Technology Co., Ltd., and China Construction Technology Group. Limited Liability Company, Jinhang Digital Technology Co., Ltd., Zhengzhou University of Light Industry, Wuhan Gongxue Zhilian Technology Co., Ltd., Dongyan Automotive Technology Group Co., Ltd., East China Branch of China Electronics Technology Standardization Institute, Shanghai Academy of Building Research Co., Ltd., Wuxi Internet of Things Industry Research Institute, Perception Data Chain (Wuxi) Technology Co., Ltd., Chongqing Institute of Quality and Standardization, Chongqing University of Posts and Telecommunications, China Electronics Technology Group Corporation The company's 38th Research Institute, Xi'an Huayun Zhilian Information Technology Co., Ltd., Kunlun Digital Intelligence Technology Co., Ltd., and Tianjin Special Equipment... Supervision and Inspection Technology Research Institute, Dongfang Electric (Chengdu) Innovation Research Co., Ltd., Shanghai Yixun Information Technology Co., Ltd., Nanjing University of Aeronautics and Astronautics Universities, Northwestern Polytechnical University, University of Electronic Science and Technology of China, Sixth Design and Research Institute of Machinery Industry Co., Ltd., Suzhou Gebi Intelligent Technology Co., Ltd. Chongqing University of Posts and Telecommunications Industrial Internet Research Institute, Yilian Cloud Computing (Hangzhou) Co., Ltd., Zhejiang Moke Laser Intelligent Equipment Co., Ltd. The 54th Research Institute of China Electronics Technology Group Corporation, Wuxi Internet of Things Innovation Center Co., Ltd., and China Mobile (Hangzhou) Information Technology Co., Ltd. Company, Geely Automobile Research Institute (Ningbo) Co., Ltd., Zhejiang Xitumeng Digital Technology Co., Ltd., Unmanned Intelligent Reality (Beijing) Technology Co., Ltd. Shanghai Tianchen Micro-Nano Technology Co., Ltd., Sinomach Industrial Internet Research Institute (Henan) Co., Ltd., and COSMOPlat Industrial Intelligence Research Institute (Qingdao) Co., Ltd., Beijing Research Institute of China Telecom Corporation Limited, Shaanxi Provincial Information Engineering Research Institute, Shanghai Chuangjing Information Technology Co., Ltd. Limited Liability Company, CRRC Zhuzhou Times Electric Co., Ltd., Beijing Jiaotong University, CNOOC Energy Development Equipment Technology Co., Ltd., Guangzhou Mingluo Equipment Co., Ltd., Jiangxi Provincial Water Investment Jianghe Information Technology Co., Ltd., Guangzhou Jinyuan Technology Development Co., Ltd., and Jinka Smart Xu Fuxiao, Liu Qi, Wen Jihong, Zhang Song, Li Ming, Huang Qin, Wu Yang, Cheng Jianchao, Zheng Chao, Lin Ying, Liu Yuming, Shao Lei, Peng Yuhuai.

A digital twin is a digital representation of a specific target entity with a data connection that

guarantees both physical and virtual states. Synchronization is performed between them at an appropriate rate and precision. This is because digital twins possess the capabilities of virtual-real fusion and real-time interaction, iterative operation and optimization, and full... With its features of being driven by data from all elements, processes, and business operations, it has been widely applied in various fields such as manufacturing, urban development, agriculture, energy, and construction. Digital twin technology can help factory managers simulate and optimize factory production resource planning and process control instructions to improve factory design. Decision-making solutions during the planning, construction, and redevelopment phases, and improving output efficiency during factory operations; these can help city managers advance digital cities and... Simultaneous planning and construction of real-world cities enables innovative management and governance models covering the entire lifecycle of urban planning, construction, management, and operation; this can also help agricultural producers... It can monitor and optimize production operations, and provide predictive diagnostics for agricultural machinery and equipment; it can also help energy managers achieve control over energy production and... Visual monitoring and management of the transmission process, fault analysis, and remote operation and maintenance; it can help building developers advance building planning, design, and construction. Integrated management of construction and operation enables intelligent management applications for building space, health, safety, green energy conservation, predictive maintenance, and security; it can also assist medical... This allows for real-time monitoring of patients' conditions, provision of personalized medical plans, and dynamic optimization of medical resources. Facing the challenges of digital twins in multiple... Given the widespread application needs in various scenarios, standardizing digital twins is particularly important. GB/T 43441 aims to define the specifications for digital twins. The general requirements, digital entity construction, information interaction, and digital asset classification and management are proposed to be composed of four parts.

- 1.General Requirements. The purpose is to specify the reference architecture, basic requirements, functional requirements, and security requirements for digital twins.
- 2.Digital Entities. The purpose is to standardize the architecture, modeling, management, and application requirements of digital entities.
- 3.Information Interaction. The purpose is to standardize the functional architecture, interfaces, data structures, and functional requirements for information interaction.
- 4.Digital Asset Classification and Management Requirements. The purpose is to define the classification of digital assets generated during the digital twin process. and management requirements. Information technology digital twin Part

1 Scope

GB/T 43441.2-2026 is the Chinese national standard covering the digital entity at the centre

of a twin - what it represents, the attributes and behaviours it carries, its relationship to the physical thing and to other entities, and its lifecycle from creation to retirement. Part 2 of the series, first edition, and it is the piece the pumped storage twin standard GB/T 47638.1-2026 and the others are built on. It was issued on 28 January 2026 and has been in force since 1 August 2026, as a first edition. The document is under the responsibility of the Standardization Administration of China. This page is published from the official record of the 2026 edition; the clause text of a standard this recent is not yet in circulation, and the figures, limits and tables it contains are those of the document itself, delivered in full with the English translation.

This document establishes the constituent elements of digital entities in a digital twin system, and specifies the construction process and management of digital entities. And other related requirements. This document applies to the research and development and application of digital twin technology or related products.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included. For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies. This document.

GB/T 7027-2002 Basic Principles and Methods of Information Classification and Coding

GB/T 38674-2020 Information Security Technology - Guidelines for Secure Programming of Application Software

GB/T 43441.1-2023 Information Technology - Digital Twins - Part

3 Terms and Definitions

The terms and definitions defined in GB/T 43441.1-2023, as well as the following terms and definitions, apply to this document.

3.1 model An abstract description of an entity or set of entities. It enables the depiction, understanding, and prediction of the attributes of an entity or set under certain conditions or circumstances. feature. [Source: ISO /IEC /IEEE42020.2019, 3.13]

3.2 digital entity Digital mapping of the target entity. [Source: GB/T 43441.1-2023, 3.3]

3.3 digital model By digitally mapping the internal and external characteristics, behavioral patterns, and relationships of the target entity, a system is formed that corresponds to the target entity. The corresponding digital abstract description.

Note. The digital model includes the geometric model (3.5), the physical model (3.6), the