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# Digital twin — Concepts and terminology



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Australian Defence
Australian Industry Group
Australian Information Industry Association
Australian Smart Communities Association
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(b) "may" means that something is permitted.

(c) "can" means that something is possible.

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A Standard always has the following parts:

(i) The Preface states who developed the Standard, what the Standard is aiming to do, and how it relates to other documents.

(ii) The Scope states what the Standard is about, what it covers and what it does not cover.

(iii) The Normative references clause lists other documents that are referenced in the Standard as part of requirements.

(iv) The Terms and definitions clause defines important terms to help with understanding the Standard.

A Standard may also include other parts, such as the following:

(1) A normative appendix sets additional requirements that need to be conformed to.

(2) An informative appendix provides additional information or guidance. They usually do not contain requirements. If an informative appendix does contain requirements, the Standard will explain when those requirements apply.

(3) A Bibliography lists documents referenced in the Standard but not as part of requirements.

Many Standards include notes. Notes provide recommendations and/or guidance only. They never contain requirements.

# Preface

This Standard was prepared by the Standards Australia Committee IT-042, Internet of Things and Digital Twin.

The objective of this document is to establish terminology for digital twin (DTw) and describe concepts in the field of digital twin, including the terms and definitions of digital twin, concepts of digital twin (e.g. digital twin system context, life cycle process for digital twin, types of digital twin), functional view of digital twin, and digital twin stakeholders.

This document can be used in the development of other Standards and in support of communications among diverse, interested parties or stakeholders.

This document is applicable to all types of organizations (e.g. commercial enterprises, government agencies, not-for-profit organizations).

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# Contents

Page

**Preface** ..... **v**
**FOREWORD** ..... **viii**
**INTRODUCTION** ..... **x**
**1 Scope** ..... **1**
**2 Normative references** ..... **1**
**3 Terms and definitions** ..... **1**
3.1 General terms ..... 1
3.2 Data-related terms ..... 3
3.3 Model-related terms ..... 4
3.4 Performance-related terms ..... 4
3.5 Application-related terms ..... 4
**4 Symbols and abbreviated terms** ..... **6**
**5 Concepts** ..... **6**
5.1 General ..... 6
5.2 Advantages and benefits of digital twin ..... 6
5.3 Digital twin and related concepts ..... 7
5.3.1 Digital twin and the semiotic triangle ..... 7
5.3.2 Digital twin and use of system control elements in the information model ..... 9
5.3.3 Digital twin and simulation ..... 9
5.3.4 Digital twin and cyber-physical system ..... 10
5.3.5 Digital twin and Internet of Things ..... 10
5.4 Digital twin applications ..... 10
5.4.1 General ..... 10
5.4.2 Manufacturing ..... 11
5.4.3 Buildings and civil infrastructure ..... 11
5.4.4 Healthcare ..... 11
5.4.5 Cities ..... 11
5.5 Digital twin system context ..... 11
5.5.1 General ..... 11
5.5.2 Digital twin system ..... 12
5.5.3 Services ..... 12
5.5.4 Application domains ..... 12
5.5.5 Infrastructure ..... 12
5.5.6 System aspects ..... 12
5.6 Life cycle process for digital twin ..... 13
5.7 Types of digital twin ..... 14
5.7.1 General ..... 14
5.7.2 Component digital twin ..... 14
5.7.3 Asset digital twin ..... 14
5.7.4 System digital twin ..... 14
5.7.5 Process digital twin ..... 14
**6 Digital twin stakeholders** ..... **14**
6.1 General ..... 14
6.2 Digital twin system stakeholders ..... 15
6.2.1 Developers ..... 15
6.2.2 Resource providers ..... 15
6.2.3 Integrators ..... 15
6.2.4 Users ..... 15
6.2.5 Operators ..... 15
6.3 Ecosystem partners ..... 15
6.3.1 Infrastructure provider ..... 15
6.3.2 Service provider ..... 16

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6.3.3 Standards development organization ..... 16
6.3.4 Government and community ..... 16
**7 Functional view of digital twin ..... 16**
**Annex A** (informative) **Definition of digital twin in different standards ..... 18**
**Annex B** (informative) **Semiotics ..... 19**
**Bibliography ..... 22**

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# FOREWORD

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ISO/IEC 30173 has been prepared by subcommittee 41: Internet of Things and Digital Twin, of ISO/IEC joint technical committee 1: Information technology. It is an International Standard.

The text of this International Standard is based on the following documents:

| Draft | Report on voting |
|---|---|
| JTC1-SC41/362/FDIS | JTC1-SC41/372/RVD |

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Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1, available at www.iec.ch/members_experts/refdocs and www.iso.org/directives.

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# INTRODUCTION

Digital transformation continues to reshape the world at multiple scales, from a city to a building, a factory, an automobile, a process and so on. The concept of a digital twin (DTw) is not new. The concept of twinning in aerospace has been in use for over 50 years. Advances in digitalization, for example those related to the industrial Internet of Things, have enabled the concept to develop and spread outside of capital-intensive industries.

Digital twin has the potential to be widely used in multiple domains such as smart manufacturing, smart cities, smart agriculture, smart energy, smart buildings, smart health care, smart mining and many other fields. However, different fields have developed in isolation, leading to different concepts and terminology. The benefits that can be derived from the use of a digital twin will depend on the use case or cases that it has been conceived to satisfy. The degree to which the benefits are realized is dependent on the implementation of the digital twin and the degree to which it can be trusted to represent the behaviour of the target entity it represents. For example, it can help:

a) simulate and predict products or production lines, resulting in production cycle reduction and cost reduction for manufacturing companies;

b) optimize city construction based on simulation models, and realize visualization, convenience and intelligent city management for city planners;

c) monitor and optimize production operations, and perform predictive diagnosis on machinery and equipment for agricultural producers;

d) achieve visual monitoring management of energy production and transmission processes, as well as fault analysis and remote operation and maintenance for energy managers;

e) monitor patients' real-time conditions, provide personalized medical solutions, dynamically optimize medical resources for doctors, and so on.

The essence of digital twin is a pairing of two things:

- something that provides a functional purpose in reality, for example, an automobile or a petrochemical platform, designated as a target entity in this document;

- a representation of that target entity as a digital entity for the purpose of connection, integration, analysis, simulation, visualization, optimization, collaboration or, when necessary, providing external management for that target entity.

In view of the increased interest in and potential applications of the digital twin technologies, there is a need to establish a common basis and terminology to enable collaboration and cooperation, and to promote a common understanding of the concept.

The purpose of this document is to:

1) provide a common basis for understanding the concept and composition of a digital twin through definitions of digital twin-related concepts;

2) provide an overview of the life cycle of a digital twin in relation to the target entity it represents;

3) provide a basis for the development of standards, specifications and use of digital twins.

This document provides generic digital twin concepts and terminology that can be applied in any domain or across domains.

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