BSI Standards Publication

Automation systems and integration — Digital twin framework for manufacturing

Part 1: Overview and general principles

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee AMT/4, Industrial data and manufacturing interfaces.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Foreword

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This document was prepared by Technical Committee ISO/TC 184, *Automation systems and integration*, Subcommittee SC 4, *Industrial data*.

A list of all parts in the ISO 23247 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The ISO 23247 series defines a framework to support the creation of digital twins of observable manufacturing elements including personnel, equipment, materials, manufacturing processes, facilities, environment, products, and supporting documents.

A digital twin assists with detecting anomalies in manufacturing processes to achieve functional objectives such as real-time control, predictive maintenance, in-process adaptation, Big Data analytics, and machine learning. A digital twin monitors its observable manufacturing element by constantly updating relevant operational and environmental data. The visibility into process and execution enabled by a digital twin enhances manufacturing operation and business cooperation.

The type of manufacturing supported by an implementation of the ISO 23247 framework depends on the standards and technologies available to model the observable manufacturing elements. Different manufacturing domains can use different data standards. As a framework, this document does not prescribe specific data formats and communication protocols.

The scopes of the four parts of this series are defined below:

— ISO 23247-1: General principles and requirements for developing digital twins in manufacturing;

— ISO 23247-2: Reference architecture with functional views;

— ISO 23247-3: List of basic information attributes for the observable manufacturing elements;

— ISO 23247-4: Technical requirements for information exchange between entities within the reference architecture.

Figure 1 shows how the four parts of the series are related.

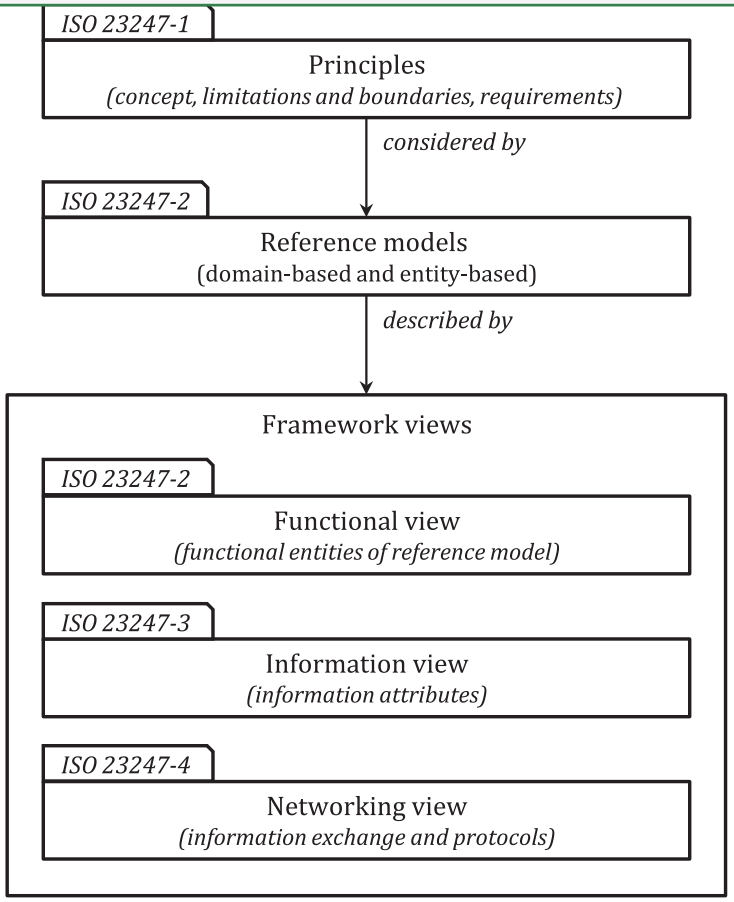

Figure 1 —
ISO 23247 series structure

ISO 23247-4:2021, Annexes A to E, provide use cases that demonstrate the digital twin framework for manufacturing. The use cases are in the discrete manufacturing domain and the digital twins are modelled using the ISO 10303 series. In other domains, different standards and technologies can be used. For example, in the oil and gas industry, digital twins may be modelled using the ISO 15926 series, and for building and construction, digital twins may be modelled using the ISO 16739 series.

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INTERNATIONAL STANDARD ISO 23247-1:2021

Automation systems and integration — Digital twin framework for manufacturing —

Part 1: Overview and general principles

1 Scope

This document provides an overview and general principles of a digital twin framework for manufacturing including:

— terms and definitions;

— requirements of the digital twin framework for manufacturing.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1 General terms

3.1.1
control
purposeful action on or in a process to meet specified objectives

[SOURCE: IEC 60050:2013, 351-42-19, modified — The Notes to entry have been removed.]

3.1.2
element
basic system part that has the characteristics of state, behaviour, and identification

[SOURCE: ISO 14258:1998, 2.2.4]

3.1.3
enterprise
one or more organizations sharing a definite mission, goals, and objectives which provides an output such as a product or service

[SOURCE: IEC 62264-1:2013]