

TECHNICAL REPORT

iTeh STANDARD
Industrial-process measurement, control and automation – Smart
manufacturing –
Part 1: Terms and definitions
PREVIEW
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL-PROCESS MEASUREMENT,
CONTROL AND AUTOMATION –
SMART MANUFACTURING –**

Part 1: Terms and definitions

FOREWORD

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Draft	Report on voting
65/863/DTR	65/904/RVDTR

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 Technical Report is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts in the IEC 63283 series, published under the general title *Industrial-process measurement, control and automation – Smart manufacturing*, can be found on the IEC website.

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- withdrawn,
- replaced by a revised edition, or
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INTRODUCTION

This document presents a vocabulary for terms that can become relevant within the scope of Smart Manufacturing. It is not intended to be a vocabulary for Smart Manufacturing, but it includes more than the terms from the other parts of this series.

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INDUSTRIAL-PROCESS MEASUREMENT, CONTROL AND AUTOMATION – SMART MANUFACTURING –

Part 1: Terms and definitions

1 Scope

The scope of this document is to compile a comprehensive collection of base terminology with compatible terms that can become relevant within the scope of Smart Manufacturing. Most of these terms refer to existing definitions in the domain of industrial-process measurement, control and automation and its various subdomains. When multiple similar definitions exist for the exact same term in different standards, this document contains only the preferred definition in the context of Smart Manufacturing. Whenever the existing definitions are not compatible with other terms in this document or when the definition does not fit into the broader scope of Smart Manufacturing, new or modified definitions are given.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

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:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1.1

<X> template

specification of the common features of a collection of <X>s in sufficient detail that an <X> can be instantiated using it in its appropriate context

Note 1 to entry: <X> can be anything that has a type.

[SOURCE: ISO 15745-1:2003, 3.33, modified – "in its appropriate context" added to definition]

3.1.2

access

ability and means to communicate with or otherwise interact with a system in order to use system resources

Note 1 to entry: Access may involve physical access (authorization to be allowed physically in an area, possession of a physical key lock, PIN code, or access card or biometric attributes that allow access) or logical access (authorization to log in to a system and application, through a combination of logical and physical means).

[SOURCE: IEC TS 62443-1-1:2009, 3.2.1]

3.1.3

access control

protection of system resources against unauthorized access; a process by which use of system resources is regulated according to a security policy and is permitted by only authorized entities (users, programs, processes, or other systems) according to that policy

[SOURCE: IEC TS 62443-1-1:2009, 3.2.2]

3.1.4

accountability

property of a system (including all of its system resources) that ensures the actions of a system entity may be traced uniquely to that entity, which can be held responsible for its actions

[SOURCE: IEC TS 62443-1-1:2009, 3.2.3]

3.1.5

action

something which happens

Note 1 to entry: Every action of interest for modelling purposes is associated with at least one object (see ISO/IEC 10746-2).

[SOURCE: ISO 15745-1:2003, 3.1]

3.1.6

activity

group of tasks that are classified as having a common objective

[SOURCE: IEC 62264-1:2013, 3.1.1]

3.1.7

actor

entity that communicates and interacts

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Note 1 to entry: These actors can include people, software applications, systems, databases, and even the power system itself.

[SOURCE: IEC 62559-2:2015, 3.2]

3.1.8

actuating drive

physical unit used for driving mechanically actuated final controlling elements

Note 1 to entry: Examples of actuating drives are electric, hydraulic or pneumatic actuating drives, diaphragm systems or piston actuators.

Note 2 to entry: No actuating drive is required for a final controlling element if the manipulated variable at the controller output is capable of directly influencing the mass flow or energy flow, i.e. without any mechanical intermediate variable quantity.

[SOURCE: IEC 60050-351:2013, 351-56-16]

3.1.9

actuator

functional unit that receives a signal to drive the final controlling element from its output variable

Note 1 to entry: If the final controlling element is mechanically actuated, it is controlled via an actuating drive. The actuator drives the actuating drive in this case.

[SOURCE: IEC 60050-351:2013, 351-49-07, modified – "generates the manipulated variable" changed to "receives a signal", "of the controlling element", example and figures removed from definition]

3.1.10

adaptive design

interoperability with assistive technology

3.1.11

administrator

user role whose responsibilities include controlling access to and implementing security policies for a system

3.1.12

administration shell

virtual digital and active representation of an Industrie 4.0 component in the Industrie 4.0 system

[SOURCE: IEC PAS 63088:2017, 3.1, modified – "Industrie" added twice, note to entry deleted]

3.1.13

aggregation

<UML> special form of association that specifies a whole-part relationship between the aggregate (whole) and a component part

[SOURCE: ISO 15745-1:2003, 3.3]

3.1.14

alarm

audible and/or visible means of indicating to the operator an equipment malfunction, process deviation, or abnormal condition requiring a timely response

[SOURCE: IEC 62682:2014, 3.1.7]

3.1.15

algorithm

completely determined finite sequence of instructions by which the values of the output variables may be calculated from the values of the input variables

Note 1 to entry: The behaviour of a system with discrete-value input and output variables (for example a switching system) may be described completely by an algorithm. For a system with continuous-value and continuous-time input and output variables the algorithm is given by or derived from the mathematical relationship between the input and output variables.

[SOURCE: IEC 60050-351:2013, 351-42-27]

3.1.16

allocation

form of coordination control that assigns a resource to an entity

3.1.17

applicable property

data element for the computer-sensible description of a property, a relation or a class

3.1.18

application

<software> software functional element specific to the solution of a problem in industrial-process measurement and control

Note 1 to entry: An application may be distributed among resources, and may communicate with other applications.

[SOURCE: IEC TR 62390:2005, 3.1.2]

3.1.19 application

<general> ordered set of processes, performed by a set of resources, coordinated by a set of interactions intended to accomplish a definite objective

[SOURCE: ISO 18435-1:2009, 3.2]

3.1.20 application programming interface API

standard set of documented and supported routines that expose operating system programming interfaces and services to applications

Note 1 to entry: An API is usually a source code interface that an operating system, library, or service provides to support requests made by computer programs.

[SOURCE: ISO/IEC TR 13066-2:2016, 2.1, modified – Example deleted]

3.1.21 arbitration

coordination control that determines how a resource should be allocated when there are more requests for the resource than can be accommodated at one time

[SOURCE: IEC 61512-1:1997, 3.2]

3.1.22 architecture

fundamental concepts or properties of a system in its environment embodied in its elements, relationships, and in the principles of its design and evolution

[SOURCE: IEC PAS 63088:2017, 3.2]

3.1.23 area

physical, geographical or logical grouping of resources determined by the site

EXAMPLE It can contain process cells, production units, production lines, and storage zones.

[SOURCE: IEC 62264-1:2013, 3.1.2]

3.1.24 artificial Intelligence AI

<engineered system> set of methods or automated entities that together build, optimize and apply a model so that the system can, for a given set of predefined tasks, compute predictions, recommendations, or decisions

Note 1 to entry: AI systems are designed to operate with varying levels of automation.

Note 2 to entry: Predictions can refer to various kinds of data analysis or production (including translating text, creating synthetic images or diagnosing a previous power failure). It does not imply anteriority.

[SOURCE: ISO/IEC 22989:__, 3.1.2]

3.1.25**artificial intelligence**

<discipline> study of theories, mechanisms, developments and applications related to artificial intelligence <engineered system> (3.1.24)

[SOURCE: ISO/IEC 22989:__, 3.1.3]

3.1.26**asset**

entity owned by or under the custodial duties of an organization, which has either a perceived or actual value to the organization

3.1.27**Asset Administration Shell****AAS**

standardized digital representation of an asset

[SOURCE: IEC 63278-1:__, 3.1.2]

3.1.28**association**

cooperative relationship between system entities, usually for the purpose of transferring information between them

[SOURCE: IEC TS 62443-1-1:2009, 3.2.7]

3.1.29**assurance**

attribute of a system that provides grounds for having confidence that the system operates in such a way that the system security policy is enforced

[SOURCE: IEC TS 62443-1-1:2009, 3.2.8]

3.1.30**attack**

assault on a system that derives from an intelligent threat – i.e., an intelligent act that is a deliberate attempt (especially in the sense of a method or technique) to evade security services and violate the security policy of a system

Note 1 to entry: There are different commonly recognized classes of attack:

- a) An "active attack" attempts to alter system resources or affect their operation.
- b) A "passive attack" attempts to learn or make use of information from the system but does not affect system resources.
- c) An "inside attack" is an attack initiated by an entity inside the security perimeter (an "insider") – i.e., an entity that is authorized to access system resources but uses them in a way not approved by those who granted the authorization.
- d) An "outside attack" is initiated from outside the perimeter, by an unauthorized or illegitimate user of the system (including an insider attacking from outside the security perimeter). Potential outside attackers range from amateur pranksters to organized criminals, international terrorists, and hostile governments.

[SOURCE: IEC TS 62443-1-1:2009, 3.2.9]

3.1.31**attribute**

property or characteristic of an entity

[SOURCE: IEC TR 62390:2005, 3.1.3]

**3.1.32
audit**

independent review and examination of records and activities to assess the adequacy of system controls, to ensure compliance with established policies and operational procedures, and to recommend necessary changes in controls, policies, or procedures

Note 1 to entry: There are three forms of audit

- a) External audits are conducted by parties who are not employees or contractors of the organization.
- b) Internal audit are conducted by a separate organizational unit dedicated to internal auditing.
- c) Controls self-assessments are conducted by peer members of the process automation function.

[SOURCE: IEC TS 62443-1-1:2009, 3.2.11]

**3.1.33
audit log**

traceable record that requires a higher level of integrity protection than provided by typical event logs

Note 1 to entry: Audit logs are used to protect against claims that repudiate responsibility for an action.

**3.1.34
augmented reality**

accumulation of information, e.g. pictures, from the real world, with additional digital information

**3.1.35
authenticate**

verify the identity of a user, user device, or other entity, or the integrity of data stored, transmitted, or otherwise exposed to unauthorized modification in an information system, or to establish the validity of a transmission

[SOURCE: IEC TS 62443-1-1:2009, 3.2.12]

**3.1.36
authentication**

security measure designed to establish the validity of a transmission, message, or originator, or a means of verifying an individual's authorization to receive specific categories of information

[SOURCE: IEC TS 62443-1-1:2009, 3.2.13]

**3.1.37
authorization**

right or permission that is granted to a system entity to access a system resource

[SOURCE: IEC TS 62443-1-1:2009, 3.2.14]

**3.1.38
automated vehicle**

mobile device that includes a control system allowing it to operate either autonomously or under remote control

[SOURCE: IEC TS 62443-1-1:2009, 3.2.15]

**3.1.39
automation**

conversion of processes or equipment to automatic operation, or the results of the conversion

[SOURCE: ISO/IEC 2382:2015, 2121284, modified – Note 1 and Note 2 removed]

3.1.40**automation object**

physical or logical entity in the automated system

Note 1 to entry: An example of an automation object is an automation component, a valve or a signal.

[SOURCE: IEC 62714-1:2018, 3.1.2]

3.1.41**autonomous**

operating without direct human intervention

3.1.42**availability**

ability of an item to be in a state to perform a required function under given conditions at a given instant or over a given time interval, assuming that the required external resources are provided

Note 1 to entry: This ability depends on the combined aspects of the reliability performance, the maintainability performance and the maintenance support performance.

Note 2 to entry: Required external resources, other than maintenance resources do not affect the availability performance of the item.

Note 3 to entry: In French the term "disponibilité" is also used in the sense of "instantaneous availability".

[SOURCE: IEC TS 62443-1-1:2009, 3.2.16, modified – "(performance)" removed]

3.1.43**available capacity**

portion of the production capacity that can be attained but is not committed to current or future production

[SOURCE: IEC 62264-1:2013, 3.1.3] [IEC TR 63283-1:2022
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3.1.44**backward compatability****downward compatability**

fulfilment by a new component of all the specified requirements of the compatibility profile of its predecessor

[SOURCE: IEC 62890:2020, 3.1.2]

3.1.45**base specification**

reference document containing information that is referenced by a profile

[SOURCE: ISO 15745-1:2003, 3.6]

3.1.46**basic control**

control that is dedicated to establishing and maintaining a specific state of equipment or process condition

Note 1 to entry: Basic control may include regulatory control, interlocking, monitoring, exception handling, and discrete or sequential control.

[SOURCE: IEC 61512-1:1997, 3.4]

3.1.47**batch**

- (1) material that is being produced or that has been produced by a single execution of a batch process
- (2) entity that represents the production of a material at any point in the process

Note 1 to entry: Batch means both the material made by and during the process and also an entity that represents the production of that material. Batch is used as an abstract contraction of the words "the production of a batch."

[SOURCE: IEC 61512-1:1997, 3.5]

3.1.48**batch control**

control activities and control functions that provide a means to process finite quantities of input materials by subjecting them to an ordered set of processing activities over a finite period of time using one or more pieces of equipment

[SOURCE: IEC 61512-1:1997, 3.6]

3.1.49**batch history**

all execution information collected pertaining to the production of a single batch, and may include common (non-batch specific) information

[SOURCE: IEC 61512-4:2009, 3.1]

3.1.50**batch process**

process that leads to the production of finite quantities of material by subjecting quantities of input materials to an ordered set of processing activities over a finite period of time using one or more pieces of equipment

[SOURCE: IEC 61512-1:1997, 3.7]

3.1.51**batch production**

production process where products or components are produced in batches and where each separate batch consists of a number of the same products or components

[SOURCE: DIN EN 14943:2006-03]

3.1.52**batch production record**

subset of the execution and business information that is retained based upon business requirements identified by the batch production record specification

Note 1 to entry: This information could include the recipe procedural element execution information, both specific equipment information, operator comments, batch-related alarms, elements related to the definition of a batch (such as control recipe, master recipe, site and/or general recipe, batch schedule information), and information important to the batch (such as training logs, maintenance records, and environmental conditions).

[SOURCE: IEC 61512-4:2009, 3.2]

3.1.53**batch schedule**

list of batches to be produced in a specific process cell

Note 1 to entry: The batch schedule typically contains such information as what to produce, how much to produce, when or in what order the batches are needed, and what equipment to use.