

TNI	Facility management Prehľad dostupných technológií (ISO/TR 41016: 2024)	TNI CEN ISO/TR 41016 96 2009
------------	--	--

Facility management - Overview of available technologies (ISO/TR 41016:2024)

Táto technická normalizačná informácia obsahuje anglickú verziu CEN ISO/TR 41016:2024, ISO/TR 41016:2024.

This Technical standard information includes the English version of CEN ISO/TR 41016:2024, ISO/TR 41016:2024.

Táto technická normalizačná informácia bola oznámená vo Vestníku ÚNMS SR č. 06/24

138753



Úrad pre normalizáciu, metrológiu a skúšobníctvo Slovenskej republiky, 2024
Slovenská technická norma a technická normalizačná informácia je chránená zákonom č. 60/2018 Z. z. o technickej normalizácii v znení neskorších predpisov.

TECHNICAL REPORT

CEN ISO/TR 41016

RAPPORT TECHNIQUE

TECHNISCHER REPORT

April 2024

ICS 03.080.10

English Version

Facility management - Overview of available technologies (ISO/TR 41016:2024)

Facility management - Vue d'ensemble des
technologies disponibles (ISO/TR 41016:2024)

Technologie im Facility Management -
Anwendungsbereich, Schlüsselkonzepte und Vorteile
(ISO/TR 41016:2024)

This Technical Report was approved by CEN on 13 January 2024. It has been drawn up by the Technical Committee CEN/TC 348.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

CEN ISO/TR 41016:2024 (E)

Contents	Page
European foreword.....	3

European foreword

This document (CEN ISO/TR 41016:2024) has been prepared by Technical Committee ISO/TC 267 "Facility management" in collaboration with Technical Committee CEN/TC 348 "Facility Management" the secretariat of which is held by SN.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users' national standards body/national committee. A complete listing of these bodies can be found on the CEN website.

Endorsement notice

The text of ISO/TR 41016:2024 has been approved by CEN as CEN ISO/TR 41016:2024 without any modification.



Technical Report

ISO/TR 41016

Facility management — Overview of available technologies

*Facility management — Vue d'ensemble des technologies
disponibles*

**First edition
2024-04**

ISO/TR 41016:2024(en)**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2024

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

ISO/TR 41016:2024(en)

Contents

	Page
Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Scope of facility management technology	1
4.1 Facility management technology.....	1
4.2 Impact of application on facility management business goals.....	2
4.3 Golden thread initiative.....	2
4.4 Asset and facility management applications.....	2
4.5 Interfacing.....	2
4.6 Optimization systems.....	3
4.7 Facility management technology drivers.....	3
5 Key concepts: Domains in facility management technology	4
5.1 Ontologies.....	4
5.2 Conceptual landscape.....	5
5.3 Foundation domain pillars.....	5
5.4 Operating environment.....	6
5.5 Horizontal versus hierarchical structures.....	6
5.6 Grids and networks (FMTech periodic table reference: column 1).....	8
5.6.1 General.....	8
5.6.2 Networks (FMTech periodic table reference: MbN, 1.1; LAN, 1.2; WAN, 1.3).....	8
5.6.3 Utilities (FMTech periodic table reference: UTL, 1.4).....	9
5.7 Transactions, security and storage (FMTech periodic table reference: column 2).....	10
5.7.1 General.....	10
5.7.2 Biometrics (FMTech periodic table reference: Biom, 2.1).....	10
5.7.3 Cyber security (FMTech periodic table reference: CS, 2.2).....	10
5.7.4 Blockchain (FMTech periodic table reference: BC, 2.3).....	11
5.7.5 Backup (FMTech periodic table reference: BU, 2.5).....	11
5.7.6 Smart contracts (FMTech periodic table reference: SmC, 2.6).....	12
5.8 Automation, monitoring and delivery (FMTech periodic table reference: column 3).....	12
5.8.1 Robotics (FMTech periodic table reference: RBT, 3.1).....	12
5.8.2 Wearables (FMTech periodic table reference: Wbl, 3.3).....	12
5.8.3 Smart assets and digital experience monitoring (FMTech periodic table reference: SmA, 3.4; DEM, 3.5).....	12
5.9 Digital workplace (FMTech periodic table reference: column 4).....	13
5.9.1 General.....	13
5.9.2 Virtual reality and assistants (FMTech periodic table reference: AR, 4.1; VR, 4.2; VA, 4.3; 3DA 4.4).....	13
5.9.3 Smart workspaces.....	13
5.9.4 Operational applications (FMTech periodic table reference: OA, 4.5).....	14
5.10 Computer and data insights (FMTech periodic table reference: column 5).....	14
5.10.1 General.....	14
5.10.2 Computer vision and learning types (FMTech periodic table reference: CV, 5.1; ML, 5.2; CC, 5.3; DL, 5.5).....	14
5.10.3 Natural language processing (FMTech periodic table reference: NLP, 5.4).....	15
5.10.4 Deep learning and neural networks (FMTech periodic table reference: DL, 5.5; NN, 5.6).....	15
5.11 Information models and frameworks.....	16
5.11.1 General.....	16
5.11.2 Building information modelling and location referencing (FMTech periodic table reference: BIM, 6.1; GIS, 6.2).....	16
5.11.3 Whole life management (FMTech periodic table reference: WL, 6.5).....	17

ISO/TR 41016:2024(en)

5.11.4	Health and safety, and well-being (FMTech periodic table reference: HS, 6.6; Well, 6.7)	17
5.12	Data-generating systems for re-commissioning and restoration	17
6	Business case benefits from technological applications in facility management	18
6.1	Facility management technological strategy	18
6.2	Response to organizational needs	18
6.3	Formation of a guiding coalition	20
6.4	Choice of technology	21
6.5	Creation of the business case and proof of return on investment	22
6.6	Agile project management	22
6.6.1	General	22
6.6.2	Examples of agile methodologies	23
6.7	Programmatic risk of being an early adopter	23
6.7.1	General	23
6.7.2	Risk management	24
6.7.3	Progress pace and judgement errors	24
6.7.4	Risk mitigation	24
6.8	FM technology maturity	25
6.8.1	Gap analysis	25
6.8.2	Assessment of business needs	25
6.8.3	Demand functionality	27
6.8.4	Maturity levels	27
6.8.5	Additional considerations	28
6.9	Harnessing of opportunities available through technology	28
6.9.1	Point of intersection with facility management practice	28
6.9.2	Intersection by stakeholders — Supporting change	29
6.9.3	Intersection by function	32
	Annex A Example of an ecosystem landscape	35
	Bibliography	36

ISO/TR 41016:2024(en)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 267, *Facility management*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 348, *Facility management*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

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.

ISO/TR 41016:2024(en)

Introduction

This document provides facility managers, their teams and stakeholders an overview of available facility management (FM) technologies. Only by understanding technology's diverse, evolving potential can the facility manager community make best use of its scope, efficiencies and benefits to support its everyday operations.

The long-term benefits of FM technology are not only commercial or budgetary, relating to hard or soft services, safety or environmental objectives, or achieving process change; they will contribute to achieving the United Nation's Sustainable Development Goals (SDGs). As a component of the ISO 41000 family of standards, integrated technology also offers significant potential value by providing input to their core business strategy roadmap. It will allow facility managers to fully understand and deploy the power of technology as a business productivity enabler, to improve on their capabilities and system capacities. Those that take advantage and embrace technology will be better able to shape the vision of an enhanced, digitalised FM experience.

Globally, the FM industry continues to adapt by advancing thought leadership and creating innovative, operational digital frameworks. Applied effectively, frameworks that are designed to foster international best practices will enhance the productivity of the FM workforce and enable each FM sector keep pace with digital advancements and transformation campaigns.

Further education on achievable goals is needed, as well as a shared common vocabulary and a collective understanding. Digital FM (DFM) is the interface between FM and technology. It presents an ideal opportunity for transformation, enhancing workforce skillsets, improving asset owners' awareness and service delivery performance capabilities, by further automating the built environment and connecting all stakeholders.

FM has become a globally recognized discipline, in which challenges are faced, be they technology-related, involving safety or environmental protection, or even from pandemics or budget constraints. It is important to note that facility management is a people-centric sector. As devices become more tech-capable, these resources need to be able to work in buildings that are categorized as SMART (specific, measurable, achievable, realistic and time-related). From the PC to the internet, smartphones to energy management, the public has high expectations from technology and its everyday use. Well-managed facilities and carefully applied technology enable facility occupants to work effectively and safely, in a constantly changing digital environment. Facility managers need to be an integral part of this digital transformation.

Adoption of the Internet of Things (IoT), together with Building Information Modelling (BIM), the use of 5G telecoms, new software products and applications for 3D to 7D management of the life cycle of buildings (including their design, construction, operations and maintenance), is not a single change management programme. This document gives insight into the means by which technology can be more understood and better incorporated, a key part of a business strategy.

Facility management — Overview of available technologies

1 Scope

This document provides an overview of the available facility management (FM) technologies. This document is applicable to facility managers, their teams and their stakeholders. It aligns specifically with ISO/TR 41013, the ISO 19650 series and the ISO 41000 family of standards as part of an integrated framework to achieve FM best practice.

This document outlines various long-term benefits and enhanced value that can be derived progressively by the operators, occupants and owners of facilities, worldwide, via the effective application of technology. This document includes, defines and categorises systems, equipment, methodologies and software applications that are available.

This framework defines how facility managers can understand and integrate digital practice and technologies in the built environment.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 41011, *Facility management — Vocabulary*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN