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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

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 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 or www.iec.ch/members_experts/refdocs).

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This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 42, *Artificial intelligence*.

This second edition cancels and replaces the first edition (ISO/IEC TR 24030:2021), which has been technically revised.

The main changes are as follows:

- selection of 51 “in operation” use cases from Annex A (informative), Collected use cases of ISO/IEC TR 24030:2021;
- collection and selection of 30 additional use cases;
- enhanced the use case submission form and the structure of use case description in [Clause 7](#) to describe the desirable information of use cases;
- updated the statistics in [6.5](#) to reflect the use cases in this document;
- removed the subclauses that are no longer suitable for the use cases in this document (e.g. 6.6.3, Annex A and Annex C in the first edition);
- removed most of the terms from [Clause 3](#) to leave two definitions in this document.

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 and www.iec.ch/national-committees.

Introduction

This document provides a collection of artificial intelligence (AI) use cases in a variety of domains.

In total, 187 AI use cases were submitted by experts between July 2018 and the end of June 2022. In this document, the term “use cases” means “use cases selected from those submitted”. This document selected 81 in-operation use cases from all submissions.

The rationale for this document is as follows:

- illustrating the applicability of the AI standardization work across a variety of application domains;
- input to and reference for AI standardization work;
- sharing the collected use cases in support of AI standardization work with external organizations and internal entities to foster collaboration;
- reach out to new stakeholders interested in AI applicability;
- liaising with organizations to collect requirements for AI through use cases;
- by investigating use cases, it is possible to find new technical requirements (standardized demands) in the market, which can accelerate the pace of transformation of scientific and technological achievements.

While a bottom-up approach was used to collect use cases, a top-down approach is used in this document to identify AI applications, their deployment models, and their application domains, as shown in [5.2](#)

The first step taken to collect use cases was to identify application domains of AI systems (described in [Clause 5](#)) and to provide a use case template (described in [6.4](#) and [Annex A](#)). Contributors were requested to submit use cases using the provided template.

To improve the quality of use cases, guidance has been provided to contributors. This guidance includes acceptable sources (described in [6.3](#)) and the characteristics of the AI systems (described in [6.4](#)) that are used to develop use cases.

In this document, [6.5](#) includes basic statistics of use cases. [Subclause 6.6](#) introduces societal concerns that affect many use cases.

The use cases were grouped and categorized according to the identified application domains. In this document, use cases are grouped, categorized, and summarized according to the identified application domains in [Clause 7](#). Use cases of specific application domains and their original submissions can be found at <https://standards.iso.org/iso-iec/tr/24030/ed-2/en>.

The perspectives of security and privacy in the AI use cases can be found in ISO/IEC TR 27563^[6]. ISO/IEC TR 27563^[6] includes a security and privacy analysis of the use cases in ISO/IEC TR 24030:2021. It is mentioned that the analysis was carried out independently from the use cases in ISO/IEC TR 24030:2021 contributors and therefore that it does not necessarily reflect their views.

AI is an emerging field with use cases and solutions with a wide range of maturity and success. The descriptions are given for the convenience of users of this document and does not constitute an endorsement by ISO.

Information technology — Artificial intelligence (AI) — Use cases

1 Scope

This document provides a collection of representative use cases of AI applications in a variety of domains.

2 Normative references

There are no normative references in this document.

3 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:

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

3.1

artificial intelligence

AI

<discipline> research and development of mechanisms and applications of *AI systems* (3.2)

Note 1 to entry: Research and development can take place across any number of fields such as computer science, data science, natural sciences, humanities, mathematics and natural sciences.

[SOURCE: ISO/IEC 22989:2022, 3.1.3]

3.2

artificial intelligence system

AI system

engineered system that generates outputs such as content, forecasts, recommendations or decisions for a given set of human-defined objectives

Note 1 to entry: The engineered system can use various techniques and approaches related to artificial intelligence to develop a model to represent data, knowledge, processes, etc. which can be used to conduct tasks.

Note 2 to entry: AI systems are designed to operate with varying levels of automation.

[SOURCE: ISO/IEC 22989:2022, 3.1.4]

4 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply. The abbreviated terms are extracted from use cases.

ISO/IEC DTR 24030:2023(E)

AUC	area under the curve
BERT	bidirectional encoder representations from transformers
CNN	convolutional neural network
COBIT	control objective for information and related technology
CRISP-DM	cross-industry standard process for data mining
CRM	customer relations management
CSV	comma separated values
CT	computed tomography
CV	computer vision
DICOM	digital imaging and communications in medicine
DL	deep learning
EHR	electronic health record
GDPR	general data protection regulation
GPU	graphics processing unit
ICT	information and communication technology
ISP	internet service provider
ITIL	information technology infrastructure library
KPIs	key performance indicators ISO/IEC DTR 24030
LSTM	long-short-term memory network
ML	machine learning
NLP	natural language processing
NLU	natural language understanding
PACS	picture archiving and communication system
RMSE	root mean square error
RNN	recurrent neural network
ROC	receiver operating characteristic
SaaS	software as a service
SIS	smart information systems
SVM	support vector machine
UT	ultrasonic testing
XGBoost	extreme gradient boosting

5 Applications

5.1 General

This clause identifies AI applications from the perspectives of their application domains and deployment models.

5.2 Application domains

Eighteen application domains were considered as target domains for the use cases. The classifications of the application domains are based on the categories in References [16] and [17].

- agriculture: this domain refers to the science or practice of farming, including cultivation of the soil for the growing of crops and the rearing of animals to provide food or other products (see ISO 20670:2018, 3.2^[7]);
- digital marketing: this domain refers to the applications of marketing that uses the Internet and online based digital technologies such as desktop computers, mobile phones and other digital media and platforms to promote products and services;
- e-commerce/e-business (electronic commerce / electronic business): this domain is a category of business transactions, involving two or more Persons, enacted through electronic data interchange, based on a monetary and for-profit basis. Persons can be individuals, organizations or public administrations. The underlying principles and characteristics of e-commerce and e-business include: 1) being business transaction based (of both a financial and non-financial nature); 2) using information technology (computers and telecommunications); 3) interchanging electronic data involving establishment of commitments among persons;
- education: this domain refers to the applications that can provide processes by which an individual or group of people conveys, transfers or obtains knowledge about a subject or concept (see ISO 30422:2022, 3.9^[8]);
- energy: this domain refers to the industry that is the totality of all of the industries involved in the production and sale of energy, including fuel extraction, manufacturing, refining and distribution;
- fintech: this domain refers to the companies whose line of business combines software and technology to deliver financial services. the emergence of fintech companies can reshape and improve finance by cutting costs and expanding access to financial services^[20];
- healthcare: this domain refers to the applications that provide activities, services, or supplies related to the health of an individual (see ISO/TR 14639-2:2014, 2.31^[9]);
- home and service robotics: this domain refers to the science and practice of designing, manufacturing and applying robots that performs useful tasks for humans or equipment excluding industrial automation applications (see ISO 8373:2021, 3.7, 3.10^[10]);
- ICT (Information and Communications Technology): this domain refers to group of applications using information and communications (telecommunications) technologies that for gathering, storing, retrieving, processing, analysing and transmitting information (see ISO/IEC TR 24704:2004, 3.1.5^[11] and ISO/IEC 29138-1:2018, 3.3^[12]);
- insurance: this domain provides an effective mechanism for protection and risk management and limits or relieves the financial burden on the insured by mitigating the effects of unpredictable events such as illness, accident, death and natural disasters. Insurance companies pool different types of risk and use statistical analysis to project losses within a given class;
- knowledge management: this domain refers to the applications that provide combination of processes, actions, methodologies, and solutions that enable the creation, maintenance, distribution and access to knowledge (see ISO/IEC 30145-2:2020, 3.7^[13]);

- legal: this domain refers to the applications that are used in the legal services industry provide expert advice in all aspects of the law, including contract, corporate, criminal, family and estate, tax and tort law^[21];
- manufacturing: this domain refers to the industry that is industries transforming goods, that is, mainly manufacturing industries in their own right, but they also concern the repair and installation of industrial equipment and subcontracting operations for third parties^[22];
- media and entertainment: this domain comprises businesses that produce, distribute and offer ancillary digital services and products for motion pictures, television programs and commercials along with streaming content, music, video and audio recordings, broadcast, radio, text and book publishing, eSports and video games sectors^[23];
- public sector: this domain refers to businesses and industries that are owned or controlled by the government;
- security: this domain refers to the industry that is made up of companies that manufacture and sell security products. The industry also includes licensed security agents, as well as associations that regulate security agencies, services and products^[24];
- transportation: this domain encompasses the movement of humans, animals and goods from one place to another. “Transportation” can be subdivided into “transportation infrastructure”, “transportation vehicles” and “transportation operations”;
- work and life: this domain refers to the industries in which digital technologies have had profound impacts, good and bad, and other sectors in which automation will likely experience major changes in the near future. Many of these changes have been driven strongly by “routine” digital technologies, including enterprise resource planning, networking, information processing and search^[17].

5.3 Deployment models

This document considers the use of AI applications and lists the following possible deployment models of AI applications.

- cloud services; <https://standards.iteh.ai/catalog/standards/sist/f7de31fd-c9ec-4a3a-b9fc-e48eada86254/iso-iec-dtr-24030>
- cyber-physical systems;
- embedded systems;
- hybrid (embedded systems and cloud services, or on-premise systems and cloud services);
- on-premise systems;
- social networks.

5.4 Examples of AI applications

Examples of AI applications are listed in [Table 1](#). These application examples were derived from the “Artificial Intelligence White Paper”^[16]. Each example in [Table 1](#) has an application domain, deployment mode and short description.

The applications in [Table 1](#) are the result of a top-down approach and can be considered to be indicative for collecting use cases. Not all the applications are necessarily addressed by the collected use cases.

Table 1 — Examples of AI applications

Application domain	Application	Deployment model	Short description
Agriculture	Agricultural automation	Cloud services	Monitor and manage field conditions.
		On-premise systems	Accumulate weed or insect patterns and eliminate them.
Agriculture	Craftsmanship skill transfer	Cloud services	Learn about the best practices from craftsmen and provide feedback to others.
Agriculture	Cultivation management	On-premise systems	Monitor the field condition and manage the irrigation condition.
Manufacturing	Construction planning	Cloud services	Learn about the best practices and apply them to future planning.
Manufacturing	Robot construction	Cloud services	Provide autonomous construction robots to construction sites.
		On-premise systems	
Manufacturing	Abnormality or malfunction prediction	Cloud services	Accumulate normal signal patterns to learn normal signals.
		On-premise systems	Find out abnormal signal patterns on the premises.
Security	Cyber security	Cloud services	Monitor cyber transactions against important defence assets and find out attack patterns and prevent their intrusion.
Security	Electronic warfare	Cloud services	Autonomous pilot with cloud support to enable electronic warfare.
		Embedded systems	
		On-premise systems	
Digital marketing	Online campaign performance optimization	Cloud services	Targeted advertising through data analysis.
Education	Adaptive learning	On-premise systems	Provide personalized learning materials via a learning model to achieve efficient learning results.
Education	Scoring	On-premise systems	Provide the most effective feedback to learners via the cognitive learning model to achieve the most effective learning results.
Fintech	Asset management	Cloud services	Accumulate and learn about the best practices and apply them to realize customer satisfaction.
Fintech	Fraud identification	Cloud services	Identify fraud transactions and warn managers.
Fintech	Loan screening	Cloud services	Learn about customers' backgrounds to find out abnormal loan patterns.
Fintech	Security assurance against cyber attacks	Cloud services	Learn and detect known fraud patterns or discover unknown fraud patterns.
Fintech	Stock exchange and trading	Cloud services	Accumulate the best practices and enable 24/7 trading.
Healthcare	Diagnosis support	Cloud services	Provide diagnostic or treatment information and find out abnormal condition compared with normal condition.
		On-premise systems	

Table 1 (continued)

Application domain	Application	Deployment model	Short description
Healthcare	Electronic health record system	Cloud services	Accumulate and disseminate learning disease patterns and healthy patterns, and assistants as an integrated medical support system.
		Embedded systems	
		Hybrid	
		On-premise systems	
Healthcare	New drug development	Cloud services	Curation: Find out the correlation among submitted papers.
			Molecular pattern: Find out the effective coordination of target molecule.
Legal	Early case assessment	Cloud services	AI support of work that preps had been doing.
Legal	Judicial recommendation	Cloud services	Judge support by using previous judicial judgment cases.
Transportation	Logistics in the base	Cloud services	Coordinate the best logistic move in the local procurement base warehouse.
		On-premise systems	
Transportation	Procurement logistics	Cloud services	Analyse the procurement context and propose the best procurement actions.
		On-premise systems	
Transportation	Sales logistics	Cloud services	Analyse and learn about the best practices of sales logistics and provide the most effective routes to move sales.
		On-premise systems	
Transportation	Automatic cruise control	Cloud services	Update cruise control software dynamically. Accumulate road condition data and disseminate them to autonomous agents. Mainly enabled on wheelchairs, ships and autonomous robots.
		Embedded systems	Enable autonomous driving without any help from connected devices. Mainly enabled on wheelchairs, ships and autonomous robots.
Transportation	Autonomous driving	Cloud services	Update cruise control software dynamically. Accumulate road condition data and disseminate them to autonomous agents. This application is mainly implemented on vehicles.
		Embedded systems	Enable autonomous driving without any help from connected devices. This application is mainly implemented on vehicles.
Transportation	City-wide traffic control	Cyber-physical systems	Optimize city-wide traffic flow by inspecting real-time traffic images and controlling traffic signals.