NATIONAL STANDARD OF THE REPUBLIC OF KAZAKHSTAN

INFORMATION TECHNOLOGY

Artificial intelligence

Guidance for AI applications

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Foreword

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2 APPROVED AND PUT INTO EFFECT by Order No. 64-NQ of the Chairman of the Committee for Technical Regulation and Metrology of the Ministry of Trade and Integration of the Republic of Kazakhstan dated October 23, 2025.

3 This standard is identical to the International Standard ISO/IEC 5339:2024, *Information technology — Artificial intelligence — Guidance for AI applications*.

The International Standard ISO/IEC 5339:2024 was prepared by ISO/IEC Joint Technical Committee JTC 1, *Information technology*, Subcommittee SC 42, *Artificial intelligence*.

Translated from English (en).

Official copies of the international standards on which this standard is based (developed) and which are referenced herein are available in the Unified State Fund of Normative Technical Documents.

Information on the correspondence of the referenced international and regional standards and standards of foreign countries is provided in additional Annex B.A.

Degree of correspondence — identical (IDT).

4 This standard implements the provisions of the Law of the Republic of Kazakhstan “On Informatization” dated November 24, 2015, No. 418-V.

5 INTRODUCED FOR THE FIRST TIME

Information on amendments to this standard is published in the annually issued Catalogue of Standardization Documents, while the texts of amendments and corrections are published in periodically issued information indexes of standards. In the event of revision (replacement) or withdrawal of this standard, the relevant notice will be published in the periodically issued information indexes of standards.

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Introduction

Artificial intelligence (AI) systems have the potential to bring about incremental changes and achieve new levels of performance and capabilities in areas such as agriculture, transportation, financial technology, education, energy, healthcare and manufacturing. However, potential risks associated with a lack of trustworthiness may affect the adoption and widespread use of AI. AI-based applications can have an impact on multiple stakeholders, including individuals, organizations and society as a whole.

The impact of AI use can change over time, in some cases due to the characteristics of the data used or changes in the regulatory environment. Stakeholders should be informed of the specific nature of their roles and the extent of their responsibilities. While detailed descriptions of issues in relevant standards are intended for technical specialists, this standard describes the lifecycle context of an AI-based application at a high level to facilitate mutual understanding among different stakeholders, stakeholder engagement and societal acceptance of AI technology.

This standard provides guidance on AI-based applications, reflecting the various perspectives of all stakeholders at a high level. The standard covers the “development”, “use” and “impact” perspectives of AI and addresses both functional and non-functional characteristics, such as AI trustworthiness and risk management. This guidance can be used by standards developers, application developers and other stakeholders to address questions concerning the characteristics of AI-based applications and other issues requiring consideration.

Stakeholders are identified at different stages of the AI system lifecycle, their roles and responsibilities are defined, and the processes to be carried out at subsequent stages are illustrated to ensure that stakeholder involvement is aligned with their respective roles. Stakeholders may have different levels of professional knowledge and experience. Since AI-based applications can differ from software products that do not use AI due to the capabilities of AI for continuous evolution and the need to consider trustworthiness, all stakeholders should be aware of the specific characteristics of AI.

This standard includes:

- general provisions, goals and objectives (Clause 4);
- a methodology for identifying stakeholders, the context of use, and the functional and non-functional characteristics of AI-based applications (Clause 5);
- fundamental approaches to addressing questions concerning the characteristics of AI-based applications and aspects requiring consideration (Clause 6);
- guidance for AI-based applications from the perspectives of “development”, “use” and “impact” (Clause 7).

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Artificial intelligence
Guidance for AI applications

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1 Scope

This standard provides guidance for identifying the context, opportunities and processes for developing and applying artificial intelligence (AI) applications. This standard provides a macro-level view of the AI application context, stakeholders and their roles, their relationship to the system life cycle, as well as common AI application characteristics and considerations.

2 Normative references

The following document is referred to in the text in such a way that some or all of its content constitutes requirements of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.
ISO/IEC 22989:2022, *Information technology — Artificial intelligence — Artificial intelligence concepts and terminology.*

3 Terms and definitions

For the purposes of this standard, the terms and definitions given in ISO/IEC 22989:2022 and the following apply.
NOTE ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online Browsing Platform: available at https://www.iso.org/obp

3.1 artificial intelligence application; AI application

Use of AI technology with specified functional characteristics to achieve an intended outcome within a context defined by a stakeholder.

3.2 cloud service

One or more capabilities offered via cloud computing (3.6), invoked using a defined interface.
Note 1 to entry: Adapted from ISO/IEC 22123-1:2023, 3.1.2.

3.3 private cloud

Cloud deployment model (3.5) where cloud services (3.2) are used exclusively by a single cloud service customer (3.4), and resources are controlled by that cloud service customer.

NOTE Taken from ISO/IEC 22123-1:2023, 3.2.4.

3.4 cloud service customer

Party that has a business relationship for the purpose of using cloud services (3.2).

Notes to entry:

1. A business relationship does not necessarily imply financial arrangements.
2. Adapted from ISO/IEC 22123-1:2023, 3.3.2 — “acting in a cloud service customer role” has been changed to “having a business relationship for the purpose of using cloud services”, and Note 1 to entry has been added.

3.5 cloud deployment model

Way in which cloud computing (3.6) can be organized based on the control and sharing of physical or virtual resources.

Notes to entry:

1. Examples of cloud deployment models include community cloud, hybrid cloud, private cloud and public cloud.
2. Taken from ISO/IEC 22123-1:2023, 3.2.1.

3.6 cloud computing

Paradigm for enabling network access to a scalable and elastic pool of shareable physical or virtual resources with self-service provisioning and administration on-demand.

Notes to entry:

1. Examples of resources include servers, operating systems, networks, software, applications and storage equipment.
2. Adapted from ISO/IEC 22123-1:2023, 3.1.1 — Note 2 to entry has been deleted.

4 Goals and objectives

This standard addresses the characteristics and other aspects and factors that require consideration in relation to AI-based applications. It provides a basis for mutual understanding among stakeholders, facilitating communication, engagement, and the overall acceptance and approval of AI technologies.
This standard identifies:

- the context of an AI-based application in terms of “who” (stakeholders), “what”, “when”, “where”, “why” and “how” (for the different stages of the AI lifecycle);
- stakeholders, including developers, providers, AI producers, customers (clients), partners, users, data providers, the community and relevant government authorities;
- typical functional and non-functional characteristics and aspects requiring consideration when analysing AI-based applications.

5 Context of use of the AI system

5.1 Defining the approach to the context of use of the AI system

This clause describes an approach to defining the context of use of an AI system. The stages of the AI system life cycle are considered in accordance with ISO/IEC 22989:2022 (Clause 6) and ISO/IEC 5338 [1]. At each stage, stakeholders, processes and relationships are identified in terms of the following aspects:

- **“who”** — stakeholders (e.g. organizations, individuals or groups of individuals) associated with the given context, whose interests and values can be taken into account and whose concerns can be addressed

- **“what”** — activities associated with the context of AI use, such as:
    - capabilities of the AI system and its application;
    - types of decisions supported by the application;

- **“how”** — specific methods within a particular context, such as:
    - the degree of human involvement in decision-making (e.g. autonomous or semi-autonomous processes);
    - the AI system acting as a supplementary tool (e.g. decision support, human-AI system interaction);
    - algorithmic processes;
    - data sources, data collection and data provision;
    - deployment of the system as a product or service;

- **“when”** — the time-related aspect associated with the given context, i.e. a particular process at a specific stage of the AI system life cycle, or the point in time at which a process is activated, such as the frequency of use. This depends on the context defined by the “what” aspect;
- **“where”** — the location associated with the context, i.e. where the AI-based application is used: within an organization (e.g. in business processes) or outside an organization (e.g. in customer-facing operations); the mode of application deployment (e.g. on-premises, as a cloud service or through third parties);
- **“why”** — external reasons and motivations associated with the given context, i.e. the value proposition for the “who” aspect, including customers, users and society as a whole, as well as the rationale for the application, its objectives, benefits, limitations and impact on economic, social and other areas.

5.2 Context of use of the AI system

Figure 1 illustrates a typical context of AI use, showing stakeholders, processes and their relationships with the different stages of the AI system life cycle.

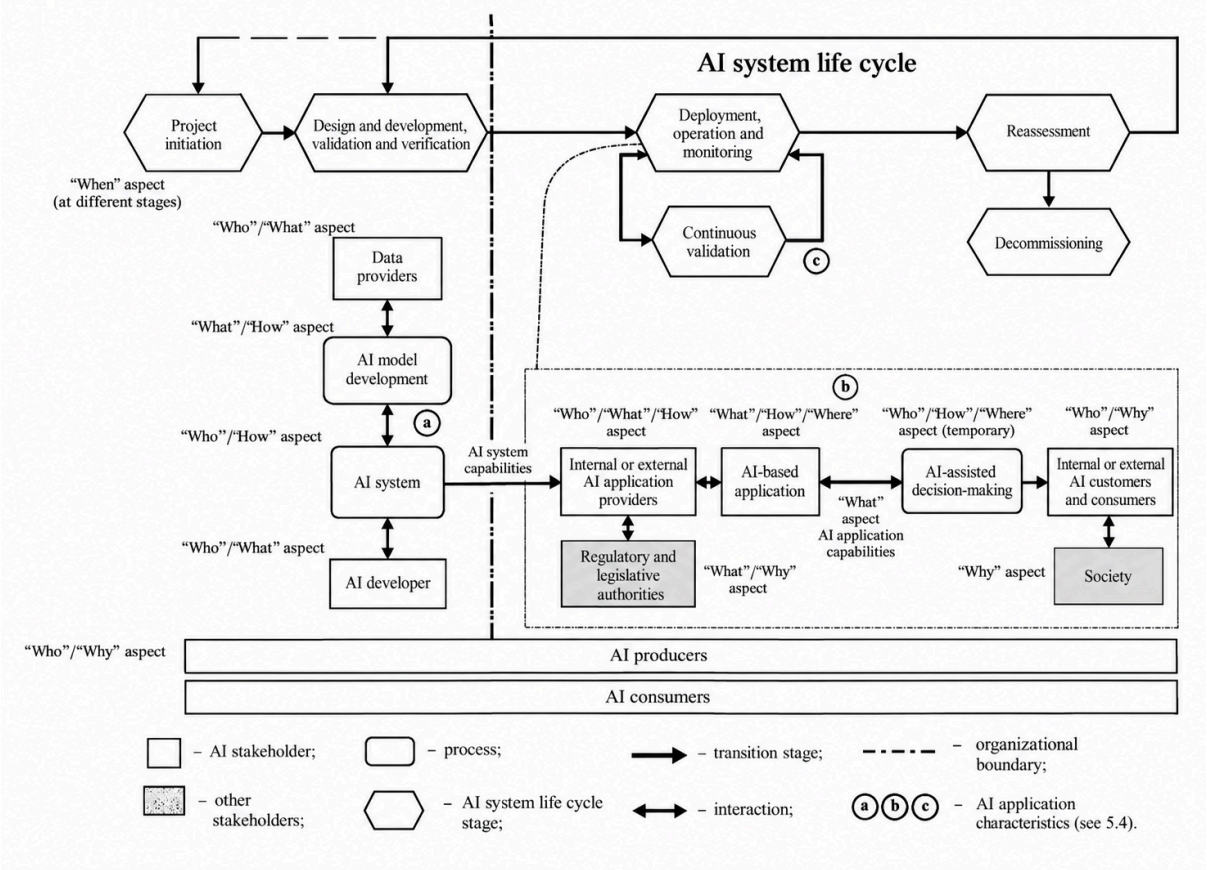


Figure 1 — Typical AI application context

Other stakeholders include members of society who are not involved in the development or use of an AI application but are affected by its use, as well as regulatory and legislative authorities that influence its deployment. Relationships between stakeholders include communication and the exchange of views.

Organizational boundaries are used to distinguish what falls within the scope of the producer organization's responsibilities and what lies outside those boundaries (e.g. before and after deployment). In some cases, an AI application provider can be part of the producer organization while performing an external role. The three characteristics of AI applications (see 5.4) are also illustrated in Figure 1.

5.3 Stakeholders and processes

5.3.1 General

Figure 1 illustrates the relationships between stakeholders (the “who” aspect), their roles (the “what”, “where” and “when” aspects), and the processes (the “what” aspect) used (the “how” aspect).

Figure 1 also illustrates that producers, consumers, regulatory authorities and society (the “who” aspect) are guided by value considerations (the “why” aspect) within the given context.

5.3.2 Stakeholders involved in AI use

5.3.2.1 General

The stakeholders involved in AI use described in this subclause perform one or more roles (primary or secondary) at different stages of the AI system life cycle. Stakeholder designations are associated with their primary or secondary roles in accordance with ISO/IEC 22989:2022 (5.19).

5.3.2.2 AI producer

An AI producer (the “who” aspect) is an organization or entity that designs, creates, tests and deploys products or provides services using one or more AI systems. The AI producer assumes these roles in accordance with the organization's objectives (the “why” aspect, e.g. generating profit or creating added value for customers). These roles span all stages of the AI system life cycle (the “when” aspect), including decisions on design, project termination and system decommissioning.

5.3.2.3 AI developer

An AI developer is an organization or entity that develops AI-based products or services for a producer. Its roles include AI model and system design, development, implementation, verification and validation (the “what” aspect) during the pre-deployment stage of the system life cycle (the “when” aspect).

An individual developer may be employed by the producer organization, work under contract or act as a partner.

5.3.2.4 AI customer

An AI customer is an organization or entity that uses a product or service directly in its own operations or acts as a provider to users. A business relationship exists between the AI application provider (see 5.3.2.6) and the customer using the application, for example, through the purchase of a product or a subscription to services.

The role of customers is related to the AI system life cycle (the “when” aspect), as customers generate demand, realize value and support the viability of a particular AI product (the “why” aspect). Customers are often consulted during the preliminary design stage to establish product requirements. They also participate in verification and validation, system deployment, operation and monitoring, and system decommissioning.

An AI customer or AI user (see 5.3.2.5) may be part of the AI application provider's organization (e.g. an organizational unit responsible for a business function) or may have an indirect relationship with the provider as an external user, for example, when the provider delivers services to a third party (the “where” aspect).

5.3.2.5 AI user

An AI user is an organization or individual that uses AI-based products or services. An AI user may be an individual member of a community (the “who” aspect) or a representative of an organization or customer company.

A customer may also be a user. An AI user does not necessarily have to be a customer, meaning that a business relationship with the AI provider (see 5.3.2.6) is not required.

The role of an AI user is typically associated with the operation and monitoring stages of the AI system life cycle (the “when” aspect), during which value is derived from the use of an AI product or service (the “why” aspect).

Other stakeholders whose interests are affected at the early stages of the system life cycle should identify relevant risks from the perspective of regulatory authorities and find solutions to avoid obstacles to achieving the intended objectives.

AI-based applications may be deployed in jurisdictions with different regulations concerning the collection, use and processing of data.

A legislative authority (the “who” aspect) is a governing body within a particular jurisdiction where an AI-based application is deployed and operated. This authority establishes the legal rules governing the use of AI technology.

5.3.4 Processes

5.3.4.1 General

A process is a function or activity that transforms specified inputs into outputs of a defined type. From the perspective of an AI-based application, the processes described in this subclause involve input data (the “what” aspect), which are transformed (the “how” aspect) by an AI system into its capabilities (the “what” aspect).

These capabilities are implemented (the “how” and “where” aspects) in an AI-based application (the “what” aspect) as a supplementary tool to support decision-making by the user (the “what”, “how” and “when” aspects).

5.3.4.2 AI system

An AI system is an engineered system designed, developed, verified and validated by an AI producer to perform specific functions, such as reasoning and decision-making, in accordance with ISO/IEC 22989:2022.

These functions define “what an AI system can do”, i.e. the capabilities of the AI system. How these capabilities are achieved depends on the configuration and structure of the AI model (see 5.3.4.3) and the type of activity for which it is intended, such as computer vision, image recognition, natural language processing, machine translation, speech synthesis, data mining and planning.

5.3.4.3 AI model and its development

An AI model is a mathematical representation of a process (the “what” aspect) that forms the basis of an AI system (see 5.3.4.2).

An AI model can be developed using various technologies, such as neural networks, decision trees, Bayesian networks, logical propositions and ontologies. These models are used to make predictions or compute decisions in order to perform AI system functions in accordance with ISO/IEC 22989:2022, 8.3.

The data required for model development can be processed through machine learning by applying an algorithm to prepared data (the “how” aspect). The required data are obtained from sources relevant to the specific domain and decision-making environment of the AI-based application (see 5.3.4.4).
Alternatively, information can be derived from accumulated human declarative or procedural knowledge, and human expertise can be used in logic programming and rule-based expert systems to perform reasoning (the “how” aspect) (see ISO/IEC 23053:2022, 7.1 [13]).

5.3.4.4 AI-based application

The capabilities of an AI system are applied within a specific decision-making environment and application domain, including agriculture, transportation, financial technology, education, energy, healthcare, manufacturing and many other sectors.
Such an application may also include non-AI-related characteristics and features designed to a specific customer in order to meet the requirements of a particular system and the needs of customers or users. The provider integrates the capabilities of an AI system into an application that can be deployed in a specific environment, where the application, in turn, demonstrates its unique capabilities.
The AI application provider may deploy the application as a product or service. Information on the levels of automation of AI-based applications is provided in 5.3.4.6 and ISO/IEC 22989:2022 (5.13).
One example is an AI system with natural language recognition capabilities combined with dialogue generation and sentiment analysis capabilities, resulting in a chatbot deployed as a cloud service to interact with users online (see the use case in A.3).
Another example is an AI system with image recognition capabilities combined with deep learning, used in medical diagnosis as an application that detects anomalies in images of biological objects. For such an application, visual information is used for training and evaluation, and is generated in accordance with the characteristics of the system and the interface for clinical diagnostic specialists who interpret the images [3].

5.3.4.5 AI application services

AI application services are activities performed for an AI customer or user (the “how” aspect) based on the capabilities of an AI application. Services may be deployed on-premises (e.g. A.2) or as a cloud service (the “where” aspect) (e.g. A.3).

5.3.4.6 AI-assisted decision-making

In a typical situation, a human decision-maker considers the following factors: a set of uncertain events, each of which may occur with a certain probability; a set of actions that can be taken if these events occur; and a set of outcomes resulting from the actions taken and the events that actually occur.
To reduce uncertainty in predicting events, the decision-maker may seek to obtain a more accurate estimate of the probability of their occurrence. This can be achieved by collecting relevant information about the environment and processing these data in the context of a specific decision to generate predictions.
Based on these predictions and decision criteria, such as maximizing the expected value of an outcome, the decision-maker's knowledge can be used to determine which action to take based on the expected value of the outcome and subsequently select the most appropriate course of action. In some cases, information from external sources is also taken into account when making the final decision.

An AI-based application is a tool used by a decision-maker to perform a particular task. As shown in Figure 1, data are collected and prepared for subsequent processing by a specific AI model (see 5.3.4.3) within a particular AI system (see 5.3.4.2). This model generates predictions that can support the decision-making process and the selection of a course of action.

An AI-based application is designed to operate with a certain degree of automation. In the first scenario, the application makes a decision and executes an action without human intervention. In the second scenario, a recommendation generated by the application is used to supplement the knowledge and experience of a human decision-maker, who makes the final decision and carries out the selected action.

The decision can be made according to a predetermined schedule, in response to a signal from a sensor, or upon the occurrence of a specific event when such a decision is required (the “when” aspect).

5.4 Functional characteristics of an AI-based application

An AI-based application differs from a non-AI application in one or more of the following functional characteristics:

a) An AI-based application is built upon the capabilities of an AI system that uses a model to acquire and process data without human intervention through algorithms and software. The model is developed using supervised, unsupervised or semi-supervised machine learning, or based on programmed rules. Information gathering for model development can also involve processes related to the application of the information obtained;

b) An AI-based application uses optimization or inferences generated by the model to provide improved decisions, predictions and recommendations in a timely manner to achieve specific objectives. Additional capabilities, characteristics and unique features are typically incorporated according to the requirements of a particular application domain or decision-making environment, or at the request of customers or users.

The form of the optimization and inference outputs to be applied depends on the model being developed. These outputs are used to supplement the information available to users when making decisions, generating predictions and providing recommendations. The application can respond and provide feedback in a changing environment, including real-time operation;

c) An AI-based application can be updated in certain cases. The model, system and application are improved by evaluating the results of interactions with the environment. The results of interactions with users are evaluated using model performance indicators (metrics), and the resulting data are subsequently used for continuous learning and improvement.

The relationship between the three characteristics listed above and the stakeholders within the AI application context is illustrated in Figure 1.

5.5 Non-functional characteristics of an AI-based application

5.5.1 General

The functional characteristics of an AI-based application are described in 5.4.

Stakeholders should also consider the non-functional characteristics of an AI-based application when making decisions concerning its use. This subclause addresses non-functional requirements specific to AI-based applications.

5.5.2 AI system trustworthiness

5.5.2.1 General

Trustworthiness is an essential non-functional characteristic of an AI system. This means that the system meets stakeholder expectations and that the degree to which these expectations are met can be verified in accordance with ISO/IEC 22989:2022 (5.15), with the system's quality characterized by dependability and reliability (see ISO/IEC TR 24028:2020 [2]).

The trustworthiness of an AI-based application encompasses the trustworthiness of the AI system as well as additional capabilities, features and characteristics specified by the customer.

Different stakeholder perspectives on AI system trustworthiness (its development, use and impact) are described

in Clause 7. Detailed information on AI system trustworthiness is provided in ISO/IEC 25059 [4].

5.5.2.2 AI robustness

AI robustness is the ability of an AI system to maintain the level of performance intended by its developers and required by its customers and users under all circumstances.

For further information on the robustness of neural networks, see ISO/IEC 22989:2022 (5.15.2), ISO/IEC TR 24029-1 [5] and ISO/IEC 24029-2 [6].

5.5.2.3 AI reliability

AI reliability is the ability of an AI system or an entity within that system to perform its required functions under specified conditions for a specified period of time [see ISO/IEC 22989:2022 (5.15.3)].

5.5.2.4 AI system resilience

Resilience is the ability of an AI system to rapidly recover to an operational state following a failure or disruption. Some resilient systems can continue to operate after a failure, although with reduced capabilities [see ISO/IEC 22989:2022 (5.15.4)].

5.5.2.5 Controllability

Controllability is a property of an AI system that enables an external agent to intervene in its operation. Controllability can be achieved by providing reliable mechanisms through which an agent can take control of the AI system [see ISO/IEC 22989:2022 (5.15.5)].

5.5.2.6 Explainability

Explainability is a property of an AI system that enables it to provide information about the significant factors influencing its outputs in a manner that is understandable to humans [see ISO/IEC 22989:2022 (5.15.6)].

5.5.2.7 Predictability

Predictability is a characteristic of an AI system that enables stakeholders to make reliable assumptions about the system's behaviour and outputs in accordance with ISO/IEC 22989:2022 (5.15.7). ISO/IEC TR 24028:2020 [2] addresses this issue from the perspective of unpredictability.

5.5.2.8 Transparency

Transparency enables stakeholders to obtain information about the intended purpose of an AI system and how it was developed and deployed [see ISO/IEC 22989:2022 (5.15.8)].

This includes information on objectives, limitations, definitions, assumptions, algorithms, data sources and collection, security, privacy protection, confidentiality and the level of automation.

Traceability, as an element of transparency and a potential source of ethical concerns, is addressed in ISO/IEC TR 24368:2022 [7].

5.5.2.9 Verification and validation

Verification is the confirmation that an AI system has been built correctly and meets specified requirements.

Validation is the confirmation, through objective evidence, that the requirements for the intended application of an AI-based application have been fulfilled [see ISO/IEC 22989:2022 (5.16)].

ISO/IEC 25059 [4] describes software engineering methods applicable to the verification and validation of AI systems.

5.5.2.10 AI system bias and fairness

The behaviour of an AI system developed using biased data may be unfair towards individuals or certain groups of people.

Fairness is associated with human perspectives and is based on individual and socially accepted norms and beliefs. Unfair behaviour of an AI system can have negative, harmful and detrimental impacts on individuals or groups of people. For further information on AI system bias, see ISO/IEC 22989:2022 (5.15.9) and ISO/IEC TR 24027:2021 [8].

5.5.3 Risks and risk management

5.5.3.1 General

Risks, like trustworthiness, are non-functional characteristics of AI systems. AI systems, like traditional software systems, operate in the presence of risks [9].

Risks are determined by the extent of the potential impact resulting from system failure or abnormal behaviour and by the individuals or communities that may be adversely affected [2].

Risks can be mitigated through risk management measures. The extent of risk management undertaken by an organization depends on the level of aggregate risk that the organization is willing to accept in the course of its activities.

In some cases, where the number of adverse factors is significant, addressing these factors can become a risk management objective throughout all stages of the system life cycle.

This sub clause describes elements related to risks and risk management (see ISO/IEC 23894 [9]).

5.5.3.2 Risk management framework and process

The risk management framework intended to “assist the organization in integrating risk management into specific activities and functions” associated with the development, provision, offering or use of AI systems is described in ISO/IEC 23894:2023, Clause 5 [9].

Processes associated with AI-related activities and functions include the systematic application of measures and methods for processing information to assess, address, record and mitigate risks, as described in detail in ISO/IEC 23894:2023, Clause 6 [9].

5.5.4 Ethical and societal concerns

5.5.4.1 General

On the one hand, AI technologies have the potential to bring substantial benefits to society, organizations and individuals. On the other hand, the use of these technologies gives rise to potentially far-reaching ethical and societal concerns.

Ethical concerns are typically associated with the collection, processing and disclosure of personal data, as well as bias in data used for machine learning and processed by opaque algorithms that lack explainability (see ISO/IEC TR 24368:2022, Clauses 6 and 8 [7]).

5.5.4.2 Ethical foundations

The ethical foundations of AI can be established on the basis of existing ethical concepts and theories, such as virtue ethics, utilitarianism, deontology and others (see ISO/IEC TR 24368:2022 [7]).

This subclause describes an approach to defining the context of use of an AI-based application (see ISO/IEC TR 24368:2022, 7.2 [7]).

Organizations intending to develop and use AI responsibly may consider adopting various AI principles (see ISO/IEC TR 24368:2022, 6.2 [7]).

Key themes associated with AI principles include traceability, safety, transparency, explainability, fairness and non-discrimination, human oversight and control, professional responsibility, commitment to universal human values and human rights, respect for international norms of behaviour, societal engagement in development processes, respect for the rule of law, environmental protection and labour relations.

For further examples of developing socially acceptable AI systems, see ISO/IEC TR 24368:2022, Clause 8 [7].

5.5.4.3 Societal concerns

The use of AI technology can potentially affect numerous stakeholders within society beyond customers and users. These stakeholders may include members of communities where AI technology is deployed or members of future generations who will experience the impact of AI on their quality of life, either in the physical environment or in the workplace.

An organization intending to develop and use AI has a responsibility to society to identify relevant stakeholders and take into account the impacts of the technology (see ISO 26000:2010 [10]).

5.5.4.4 Legal and regulatory issues

AI regulation is an emerging field. Legal frameworks governing the development, deployment and use of AI-based systems are still evolving and have not yet been fully defined.

In some jurisdictions, regulations have been introduced to address specific aspects of AI technologies and applications (e.g. facial recognition by law enforcement authorities), while numerous proposals for AI regulation are being introduced and discussed.

At present, there is no coordinated and consistent regulatory framework for AI at the domain, regional, national or international level.

6 Stakeholder perspectives and conceptual framework for AI-based applications

6.1 General

The basic AI application context described in 5.2 provides the foundation for the conceptual framework for AI-based applications presented in this clause.

This framework can be used to address the question: “What are the characteristics and overall considerations of an AI-based application?”

6.2 Stakeholder perspectives

The conceptual framework for AI-based applications described in this standard incorporates the perspectives of different stakeholder groups.

These groups have different perspectives on AI-based applications depending on their respective intentions and objectives.

Figure 2 illustrates these perspectives at the producer, user and impact levels. An organizational boundary is shown in Figure 2 to distinguish between different stakeholders.

The stakeholder perspectives focus on the analysis, functional characteristics and non-functional characteristics of AI-based applications.

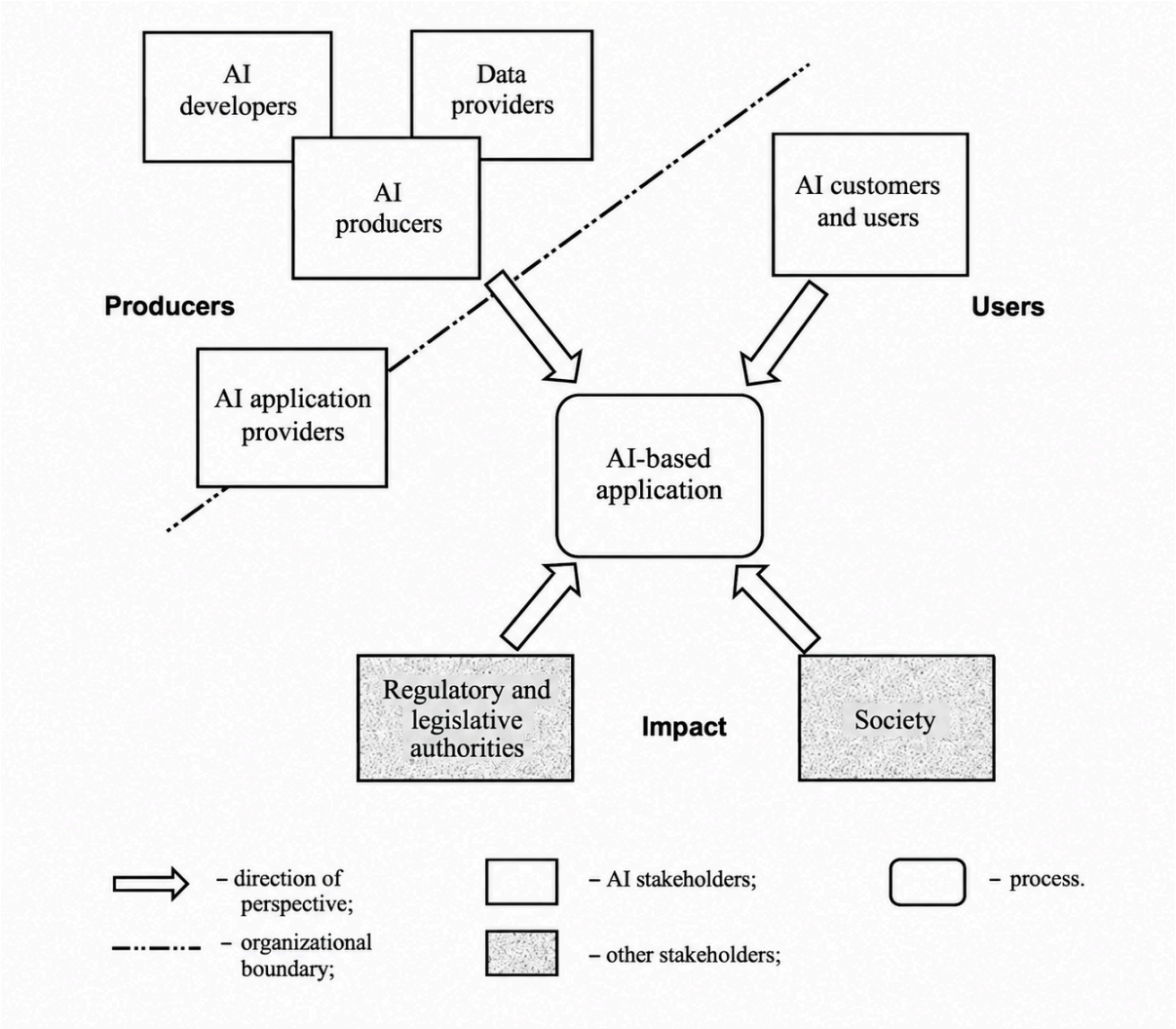


Figure 2 — Stakeholder perspectives on an AI-based application

The producer perspective represents the viewpoint of AI producers, AI developers and data providers involved in creating an AI-based application. The AI application provider shares this perspective to some extent, as it may play a role in both the production and deployment of the AI-based application.

AI customers and users adopt the usage perspective, as they use the AI-based application as a supplementary tool to support decision-making.

The societal perspective focuses on how the deployment of the application affects society. Regulatory authorities assess the extent to which deployment complies with local legal requirements (established by legislative authorities) and determine what legal enforcement measures apply to a product or service in the event of non-compliance.

6.3 AI application development environment

The combined stakeholder perspectives on the AI application development environment are illustrated in Figure 3.

Table 1 presents the producer and user perspectives on the AI application development environment and the relationships between stakeholders. Table 2 presents the impact of AI on stakeholders, while Table 3 presents AI characteristics and stakeholder involvement in processes.

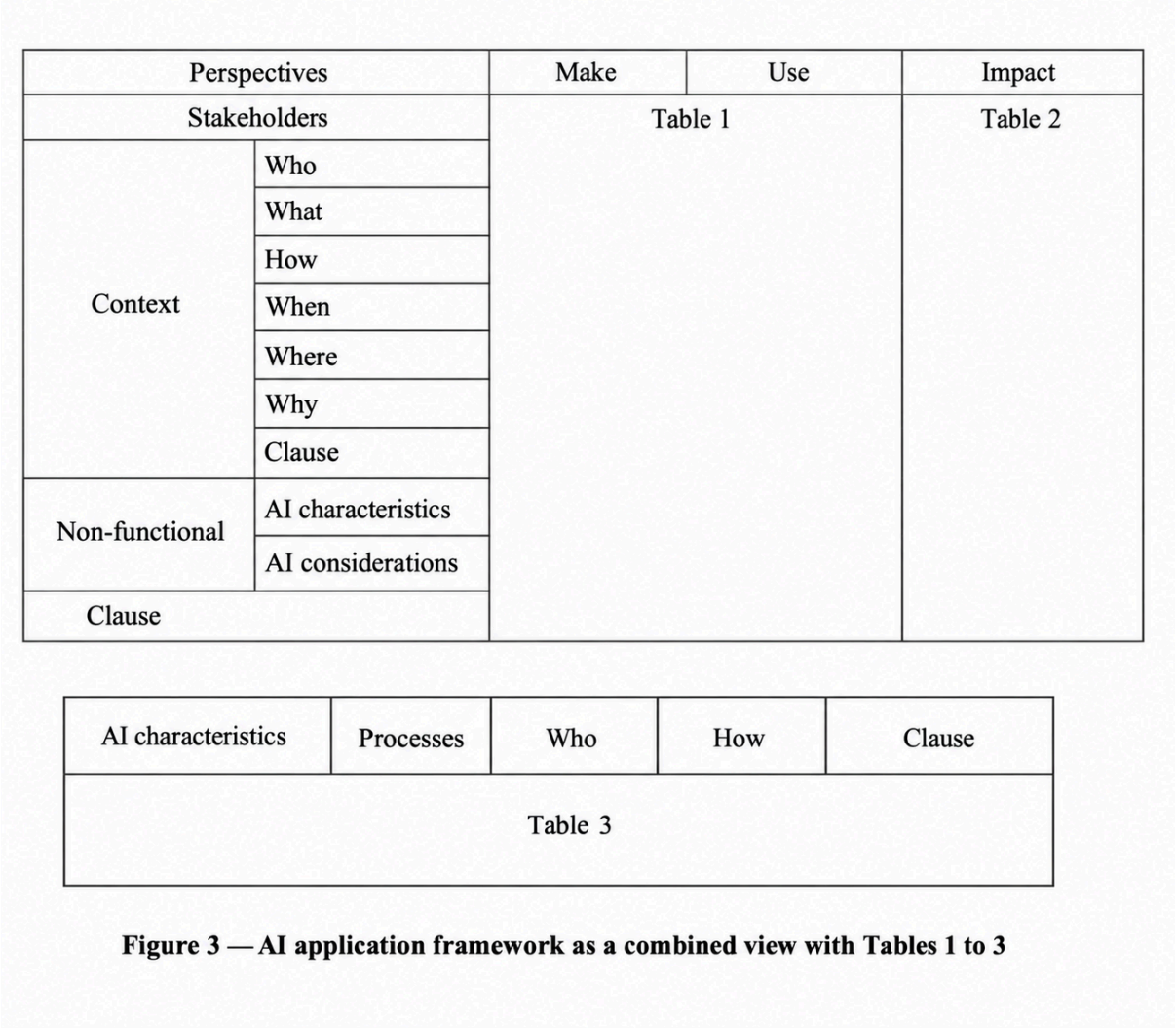


Figure 3 — AI application framework as a combined view with Tables 1 to 3

Table 1 — Producer and user perspectives on the AI application development environment and stakeholder relationships

Perspectives		Producer				User	
Stakeholders		AI producers	Data providers	AI developers	AI application providers	AI customers	AI users
Context	Who	•	•	•	•	•	•
	What (see AI characteristics in Table 3)	•	•	•	•	•	•
	How	Make, use, update	Make	Make	Make	Use	Use
	When	All stages	Design, development, validation and verification	Design, development, validation and verification	Development, operation and monitoring	All stages	Development, operation and monitoring
	Where	•	•	•	•	•	•
	Why	•	•	•	•	•	•
	Clause	7.1.2	7.1.3	7.1.4	7.1.5	7.2.2	7.2.2
Non-functional	AI characteristics	AI trustworthiness, risks and risk management					
	AI considerations	Ethical and societal concerns, legal and regulatory issues					
	Clauses	5.5.2, 5.5.3, 5.5.4					
The symbol "•" indicates stakeholder involvement in the context of AI application use.							

Table 2 — Impact of AI on stakeholders

Perspectives		Impact	
Stakeholders		Society	Regulatory and legislative authorities
Context	Who	•	•
	What	•	•
	How	•	•
	When	Deployment, operation and monitoring	Deployment, operation and monitoring
	Where	•	•
	Why	•	•
	Clause	7.3.2	7.3.3
Non-functional	AI characteristics	AI trustworthiness, risks and risk management	
	AI considerations	Ethical and societal concerns, legal and regulatory issues	
	Clauses	5.5.2, 5.5.3, 5.5.4	
The symbol " • " indicates stakeholder involvement in the context of AI application use.			

Table 3 — AI characteristics and stakeholder involvement in processes

AI characteristics	Processes	What	How	Subclause
The AI system uses a model to acquire and process information with or without human intervention, using an algorithm or programme.	Model development and AI system development	+	+	5.4
The AI system applies optimization or logical inference from the model to improve decisions, predictions or recommendations for specific objectives.	AI application use and decision support	+	+	
The model, system or application is updated and improved based on the evaluation of interaction results.	Continuous validation	+	+	
The symbol " + " indicates stakeholder involvement in the context of AI application use.				

7 Guidance for AI applications

7.1 General

This clause provides guidance to stakeholders to help them understand their roles and responsibilities, as well as their perspectives when developing or using AI-based applications or responding to the impacts of AI application use. This guidance takes into account the functional (see 5.4) and non-functional (see 5.5) characteristics of AI-based applications.
The guidance is formulated as a set of questions that each type of stakeholder should ask within the scope of their roles and responsibilities, based on the perspectives illustrated in Figure 2 and the framework presented in Table 3.
Some of these questions may provide opportunities for stakeholders to explore additional aspects of AI applications, such as the applicability of relevant International Standards to a particular application.
Annex A presents two use cases in which answers to some of the questions recommended here are used to populate the AI application framework in Table 3.

7.1.1 General considerations for producers

Stakeholders adopting the producer perspective are employees of an AI producer or its partners who design, develop, verify and validate an AI system and provide data for it. The AI system is subsequently deployed as an application.

7.1.2 Producer perspective

An AI producer should consider at least the following:

- Who are the AI customers and users?
- Who are the AI developers? Are they qualified and experienced personnel, either employed directly or engaged under contract?
- Who are the AI application providers, and what is their relationship with the AI producer?
- Who are the stakeholders at each stage of the AI system life cycle [see ISO/IEC 22989:2022 (Clause 6)]? What is the AI system, and what are its capabilities?
- What algorithm is used for the AI model?
- What AI characteristics are used in this particular application?
- What data is used to develop the AI model? What are the sources of these data? Who are the data providers and their partners?
- What is the level of trustworthiness of the AI-based application, and what risks are associated with it? What measures are taken to assess and mitigate these risks? Does the organization have a risk management system in place (see [2], [9])?
- What issues (ethical and societal concerns, safety, confidentiality, privacy and other legal and regulatory issues) arise in connection with the development and deployment of the AI-based application? How are these issues addressed [7]?
- What tools and methods are used to evaluate the AI-based application during deployment?
- What is the overall quality of the AI system (see [4], [5])?

- How is the AI-based application developed, used and updated? How is the AI model trained or programmed? How robust is the AI model? When (at which stage of the AI system life cycle) will the model structure, application and updates be analysed and reviewed? Where is the model developed, used and updated, on-premises or using cloud services? When (at which stage of the AI system life cycle) should the producer be involved in reassessing the AI characteristics in the operational environment?
- Where is the application planned to be deployed (on-premises or as a cloud service)?
  Where will the application be developed? Where are the developers located? Where are the data sources located?
  At what geographical location will the application be deployed?
- Why is the AI-based application being developed as a product or as a service?
  What is its potential value to the AI producer and the user? What are the prospects for using the developed application, and what is the action plan?

7.1.3 Data provider perspective

A data provider should consider at least the following:

- Who is the AI producer: an employer, a partner or a customer?
- What data are collected, and what are their sources? How are the data collected, stored, processed, provided and fed into the AI model (for data used in machine learning, see ISO/IEC 5259-4[1] [14])? Is a data management system used (see ISO/IEC 5259-3[2] [15])?
- In what geographical or other domain are the data collected? What limitations might apply to a model developed using these data?
- What limitations arise from the sources and inherent characteristics of the data selected for training?
- How is the quality of the collected data measured and validated (see ISO/IEC 5259-2[3] [11])? What issues are associated with data trustworthiness and ensuring that the data are free from bias? What measures are taken to assess and mitigate these issues (see ISO/IEC TR 24028:2020 [2] and ISO/IEC TR 24027:2021 [8])?
- How are data collected, validated and used to update the AI model during its operation and maintenance? How are the collected data protected and used in accordance with internal policies and data sovereignty requirements?
- When (at which stages of the AI system life cycle) should data accessibility and quality be reviewed?
- Where are the data sources located? Where will the data be processed (on-premises or using a cloud service)? In which geographical location?
- Why are these specific data required for the context of use of the AI-based application?

7.1.4 AI developer perspective

An AI developer should consider at least the following:

- Who are the AI user, data provider and AI producer?
- What is the relationship between the AI developer and the AI producer? Is the AI developer an employee or a contractor?
- What level of qualifications and experience is required for AI developers?

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[1] Under development. Stage at the time of publication: ISO/IEC DIS 5259-4:2023.
[2] Under development. Stage at the time of publication: ISO/IEC DIS 5259-3:2023.
[3] Under development. Stage at the time of publication: ISO/IEC DIS 5259-2:2023.

- What AI model is used, trained or programmed? How is the AI model designed, developed, validated and verified within the functional characteristics of the AI system?
  What processes are involved?
- What are the technical and system requirements for deploying the AI system as an accessible application?
- What algorithms are used to process the data? What are the data quality criteria? What are the criteria for the quality of output information? What are the validation and verification criteria? What are the criteria for updating the model?
- How are the data preprocessed? How is their quality determined?
  How is the algorithm selected? How are the model requirements adapted?
- When (at which stages of the AI system life cycle) are the context of use and system requirements evaluated?
- Where can the AI-based application be deployed (on-premises or as a cloud service)?
- Why is the application developed as a product or service? Why is a particular model used?

7.1.5 AI application provider perspective

An AI application provider should consider at least the following questions:

- Who are the AI customers and users, and how do they use the application?
- What is the relationship between the AI producer and the provider? Is it an employer–employee relationship or a partnership?
- What are the AI characteristics of the application? What are its capabilities, computing capacity, performance and limitations?
- What are the technical and system requirements for customers and users to access and use the application? What recovery measures are in place in the event of a failure?
- What operational performance data are available for the application, and how are these data monitored?
- What impact does the AI-based application have on customers, users and society as a whole?
- How is the AI-based application developed, used and updated? How is the AI model trained or programmed? How robust is the AI model [5], [6]?
  When (at which stage of the AI system life cycle) will the model structure, application and updates be reviewed and analysed? Where is the model developed, used and updated — on-premises or using cloud services? When (at which stage of the AI system life cycle) should the producer be involved in reassessing the AI characteristics in the operational environment?
- How are risks managed during application deployment?
- When (at which stage of the AI system life cycle) are the operating environment and requirements evaluated?
- Are there any restrictions on the use of the application, including recommended, permitted and responsible use? Are these restrictions legal requirements incorporated into the software licence?
- Where will the application be deployed? What legal requirements apply to the functional and non-functional characteristics of the application's domain of use? Which authorities are responsible for regulatory oversight?
- Why is the application developed as a product or service?

7.2 Use perspective

7.2.1 General

Stakeholders adopting the use perspective are AI customers and users who use an AI-based application as a tool to optimize the decision-making process (see 5.3.4.6).

7.2.2 AI customer and user perspective

An AI customer or user should consider at least the following:

- What is the relationship between the AI application provider and the AI customer or user?
- What restrictions apply to AI customers and users (as members of society) when using the application? What are the implications of using the application within an organization from a governance perspective (see ISO/IEC 38507:2022 [12])?
- What data are collected when using the AI-based application, and how are these data used (for machine learning, see [11])? What data governance principles have been adopted? Are the data fed back into the AI model for continuous learning and improvement?
- What is the level of trustworthiness of the AI-based application, and what risks are associated with it? What measures are taken to assess and mitigate these risks? Does the organization have a risk management system in place (see [2])?
- What are the levels of transparency and explainability of the application provided by the AI application provider?
- What ethical and societal concerns are associated with the use of the AI-based application? How are these concerns addressed?
- What types of decision-making will be optimized through the application? What is its level of automation? Who evaluates the effectiveness of the application, and what metrics are used?
- How will customers and users access the application's outputs for use in the decision-making process? How are the performance and effectiveness of the application measured?
- When (at which stage of the AI system life cycle) are the application's operating environment (context) and requirements evaluated? What legal requirements apply to the deployment of the application?
- For what purposes is the AI-based application used? What are the potential benefits and advantages of using the application?

7.3 Potential impacts of AI use

7.3.1 General

The community in which an AI-based application is deployed, as well as individual consumers within that community, may be affected by the use of the application.

Examples include the use of applications for video surveillance, credit applications, healthcare services, dissemination of information through social media and other purposes.

The deployment of such applications may be influenced by local regulatory authorities exercising jurisdiction over the use of AI technology in accordance with legal requirements established by legislative authorities.

7.3.2 Societal perspective

The community in which an AI-based application is deployed should consider at least the following questions:

- Who are the consumers? What specific concerns do they have as members of the community?

- What data are collected through the use of the application, and how are these data used? What are the concerns associated with the storage of personal data?
- How does the use of the AI-based application affect the community and consumers? How is this impact measured, how frequently, and by whom? What measures does the community take to mitigate the negative impacts of AI?
- When (at which stage of the AI system life cycle) are customer feedback and customer requirements evaluated and reviewed?

7.3.3 Regulatory and legislative authorities perspective

Regulatory and legislative authorities should consider at least the following questions:

- Who are the consumers? What specific concerns do they have as members of the community?
- What is the mechanism for establishing legal requirements governing the deployment of AI-based applications (top-down or bottom-up)? How is a particular application used, and how does its use affect a specific community? Who is responsible for these impacts (e.g. the provider, customer or user)?
- When (at which stage of the AI system life cycle) are legal requirements evaluated and reviewed?
- Where is the application deployed? What legal requirements apply to it? How will compliance of a particular application with the established requirements be monitored? Who is legally liable in the event of non-compliance?
- For what purposes is the AI-based application used? What are the potential benefits of using the application? What are its potential positive or negative impacts on society?

Annex A
(informative)
Examples of AI application use cases

A.1 General

This annex provides two examples to demonstrate the application of this standard, taking into account the context of use (see 5.2), stakeholders and processes (see 5.3), and AI characteristics (see 5.4), as reflected in the overall conceptual framework for AI-based applications (see Clause 6 and Table 3).

Some cells in Tables A.1 to A.6 are populated with answers to the questions presented in Clause 7.

A.2 Use case of an AI-based application by Fujitsu Limited[4] for detecting defects in wind turbine blades

This clause presents a use case from Fujitsu Limited involving an AI-based application that employs a deep learning algorithm to detect defects in wind turbine blades, with the aim of improving inspection quality and supporting decision-making during inspections.

The stakeholders, context of use and AI characteristics are presented in Tables A.1 to A.3, taking into account the AI application framework (see 6.3).

Table A.1 — Producer perspective using the example of Fujitsu Limited

Perspectives		Producer			
Stakeholders		AI producer	Data providers	AI developers	AI application providers
Context	Who	Fujitsu Limited[4]	Provider of ultrasound scanners	Fujitsu Limited	Fujitsu Limited
	What (see AI characteristics in Table A.3)	Responsible for the entire system	Provides data from scanners	Develops an AI system with a trained model	Receives the AI system and offers it as an application
	How (see AI characteristics in Table A.3)	Development, use and update	Creation	Creation	Creation
	When	All stages	Design, development, validation and verification	Design, development, validation and verification	Deployment, operation and monitoring

[4] Fujitsu™ is a trademark of Fujitsu Limited. This information is provided for the convenience of users of this standard and does not constitute an endorsement of this product by ISO or IEC.

Table A.1 (*continued*)

Perspectives		Producer			
	Where	Producer	Producer	Producer	Customer location
Context	Why	The producer should develop a high-quality application for the customer, taking into account the purpose and requirements of the application through dialogue with the customer.			
Blank cells indicate that information is not provided.					

Table A.2 — User perspective and impact of AI using the example of Fujitsu Limited

Perspectives		Users		Impact	
Stakeholders		AI customers	AI users	Society	Regulatory and legislative authorities
Context	Who	Wind turbine manufacturer	Specialist from the manufacturer's technical inspection department, inspection engineer	Electricity company users and neighbouring wind turbine communities	For example, in the European Union: Directorate-General for the Internal Market, Industry, Entrepreneurship and SMEs, and small and medium-sized enterprises
	What				
	How	Use	Use		
	When	Deployment, operation and monitoring	Deployment, operation and monitoring	Deployment, operation and monitoring	Deployment, operation and monitoring

Table A.2 (*continued*)

Perspectives		Users		Impact	
		Customer location	User location	—	—
Context	Where				
	Why	Defects in turbine blades during operation can lead to accidents and significant damage, adversely affecting the manufacturer's reputation. The manufacturer supplies more than 5 000 turbine blades per year for onshore and offshore wind power generation. For blades up to 75 m in length, 6 hours of work by an experienced inspector are required to evaluate the scan data during the quality control process. The AI system reduces the inspection time by 80 %, thereby lowering costs, shortening the production cycle and increasing productivity.	Specialists from the technical inspection department are interested in improving productivity through the use of AI and in enhancing the efficiency of application operation.	Residents living near the wind power generation facilities are concerned about potential losses, which may occur if defects in wind turbines are not detected.	A regulatory authority ensures the safety of products on the basis of legal and regulatory requirements for the manufacture of large-scale objects such as turbine blades, including liability for product defects.
Blank cells indicate that information is not provided.					

Table A.3 — Characteristics of the AI-based application using the example of Fujitsu Limited

AI characteristics	Processes	What aspect	How aspect
The AI system uses a model to obtain information and process it with or without the help of a human, using an algorithm or a programme	Training phase — algorithmic processes	Deep learning and image enhancement	Transformation of raw data from ultrasound (US) scanning into images using basic colours (red, green, blue)
	Application — implementation stage	Defect detection	Review of data from non-destructive testing using US scanning
Application of optimization or logical inference from the model to improve decisions, forecasts or recommendations for specific purposes	Decision-making	Decision-making at the quality control stage	A person makes a decision in interaction with the machine. The AI system detects 95 % of defects. A person inspects only those parts of the blade that are highlighted by the AI system. For example, in the absence of an echo signal from the bottom, inclusion of foreign objects or irregularities.
Updating and improving the model, system or application based on the assessment of interaction results	Continuous validation	Deep learning and image enhancement	Monitoring of results for a defined period after the last or repeated training, or until the introduction of a new manufacturing process

A.3 Use case of an AI-based application in LivePerson[5] chatbots for natural language understanding

This clause presents a use case from LivePerson involving an AI-based application that uses machine learning to improve the quality of human–machine dialogue through natural language understanding (NLU), combined with contextual and domain understanding and sentiment analysis.

The stakeholders, context of use and AI characteristics are presented in Tables A.4, A.5 and A.6, taking into account the AI application framework (see 6.3). For a combined representation of the framework, see Figure 3.

Table A.4 — Producer perspective using the example of LivePerson

Perspectives		Producer			
Stakeholders		AI producer	Data provider	AI developers	AI application providers
Context	Who	LivePerson	Customer	LivePerson	LivePerson, messaging and NLU processing providers
	What (see AI characteristics in Table A.6)	Development of NLU, network chat, a set of development tools for messaging applications, connectors for messengers (applications) for third parties	Collection of chat transcripts in chat and messenger between people and between bots and people	Development of the NLU engine, applications and contact centre interfaces, and management interfaces for communication between stakeholders	Provision of an application for messaging based on operating systems for manual devices, and an application offered to third parties
	How (see AI characteristics in Table A.6)	Development, use and update	Creation	Creation	Creation

[5] LivePerson™ is a trade mark of LivePerson, Inc. This information is provided for the convenience of users of this standard and does not constitute an endorsement of this product by ISO or IEC.

Table A.4 (*continued*)

Perspectives		Producer			
Context	When	All stages	Design, development, validation and verification	Design, development, validation and verification	Design, development, validation and verification
	Where	Third-party public cloud and platform	Third-party public cloud and platform	Third-party public cloud and platform	Third-party public cloud and platform
	Why	Engagement: provides opportunities for customer service representatives and agents to support and serve customers. Deploys chatbots in cases where a representative or agent is not available, or to filter queries using sentiment analysis and route them to other bots or staff members.	The NLU should meet the requirements of customers and the industry. Customers may choose to create their own bot and fully or partially automate their conversations.	Chat commerce requires specialists in a dedicated language model and intent analysis. Although LivePerson may use the NLU of other providers, its own NLU is developed based on the requests of specific customers.	—

Table A.5 — User perspective and impact of the AI-based application using the example of LivePerson

Perspectives		Users		Impact	
Stakeholders		AI customers	AI users	Society	Regulatory and legislative authorities
Context	Who	Customer	Users and networks	Members of society	For a specific sector, for example, insurance, banking and credit card processing, telecommunications and mass media, healthcare. Depending on the application, for example, it may be necessary to identify the AI-based application as an automated service. Depending on confidentiality requirements, for example, protection of customers' personal data may be required.
	What	Distribute messages from customers to people or bots			
	How	Use	Use		
	When	Deployment, operation and monitoring			
	Where	Third-party public cloud			

Table A.5 *(continued)*

Perspectives		Users		Impact
Context	Why	Large contact centres and messengers need to distribute inquiries for customer service, sales, technical support and complaints to groups of specialists.	—	Many industries are regulated to protect consumers and society as a whole. Messages are compared with voice or personal dialogue, are recorded in writing, allow organizations to monitor their quality in real time, and reveal risks, vulnerabilities of customers, and potentially inappropriate behaviour.
Blank cells indicate that information is not provided.				

Table A.6 — Characteristics of the AI-based application using the example of LivePerson

AI characteristics	Processes	What aspect	How aspect
The AI system uses a model to obtain information and process it with or without the help of a human, using an algorithm or a programme	Machine learning. NLU	Conversation builder helps customers to create chatbots for their own purposes	Collection of data for machine learning to improve the capabilities of AI
Application of optimization or logical inference from the model to improve decisions, forecasts or recommendations for specific purposes	Chatbot. Intent analysis	Communication with users through live interaction with customer service representatives. Agents and chatbots are integrated into the system	Autonomous web-based conversation with users

Table A.6 *(continued)*

AI characteristics	Processes	What aspect	How aspect
	The service agent specializes in labeling and responding	Additional capabilities for the agent through analysis of user intent statements to select optimal responses	Enhancement of the work of customer service representatives and agents with capabilities to serve customers consistently and effectively
Updating and improving the model, system or application based on the assessment of interaction results	Chatbots, service agents	Feedback of training data to the model	Monitoring improvements in response quality and insight from customer dialogue, using ranking for agents and chatbots

Figure A.1 illustrates the components of the LivePerson AI-based application within its operating environment. The application uses integrated natural language processing and sentiment analysis capabilities to conduct conversations with users through online chat.
The application also stores data from these conversations for use in machine learning as part of the continuous improvement of the system.

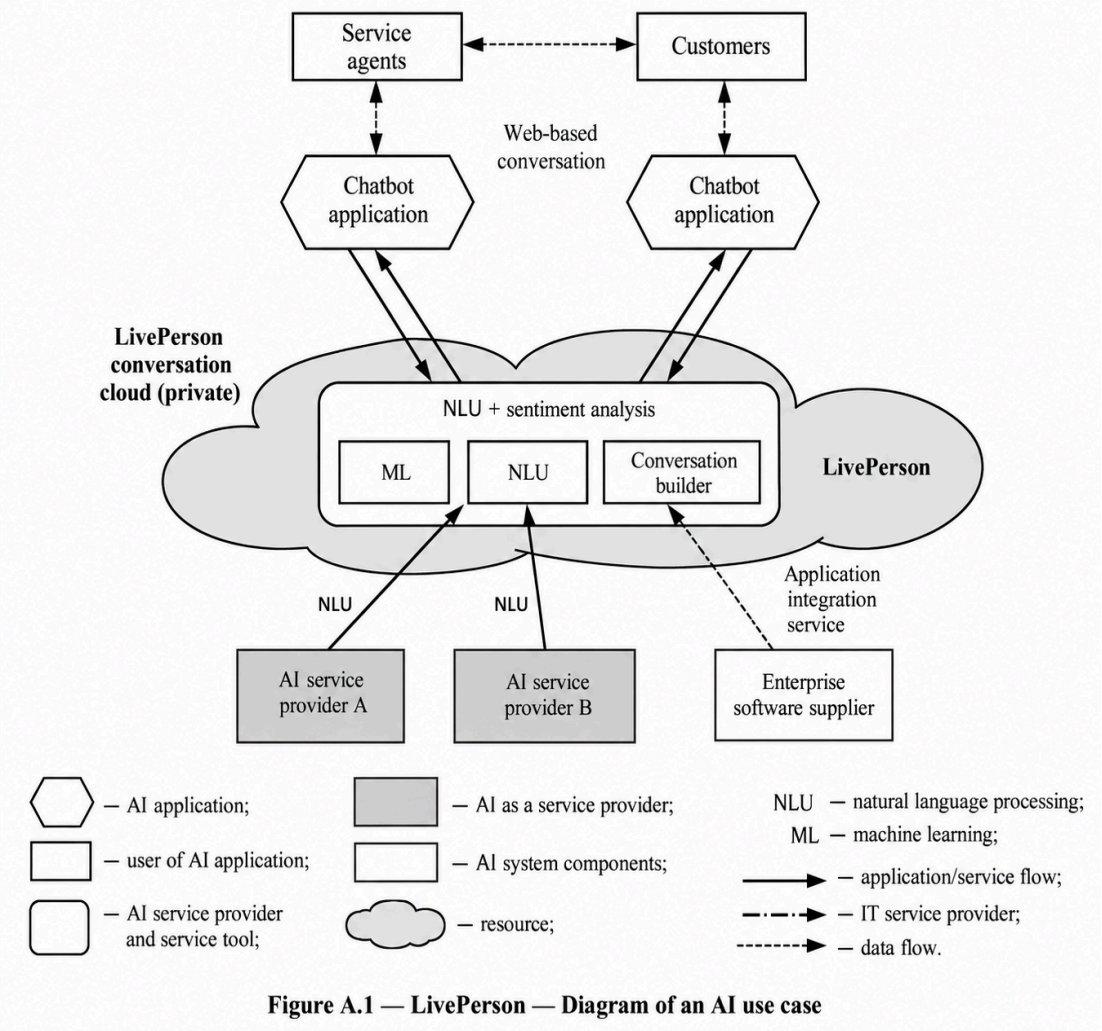


Figure A.1 — LivePerson — Diagram of an AI use case

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[6] *Under preparation. Stage at the time of publication: ISO/IEC DIS 5259-2:2023.*

[7] *Under preparation. Stage at the time of publication: ISO/IEC DIS 5259-4:2023.*

[8] *Under preparation. Stage at the time of publication: ISO/IEC DIS 5259-3:2023.*

Annex B.A
(informative)

Information on the correspondence of reference international, regional and national standards

Table B.A.1 — Information on the correspondence of reference international, regional and national standards

Reference to and title of international, regional standard or international standard of another country	Degree of correspondence	Reference to and title of national, intergovernmental standard
ISO/IEC 22989:2022 Information technology — Artificial intelligence — Artificial intelligence concepts and terminology	MOD	ST RK 4010-2025 Information technology — Artificial intelligence — Concepts and terminology of artificial intelligence

ICS 35.240

Keywords: artificial intelligence (AI), guidance on the application of AI, functional characteristics, non-functional characteristics, trust in AI, risk management.

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