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Information technology — Artificial intelligence — AI system life cycle processes

Technologies de l'information — Intelligence artificielle — Processus de cycle de vie des systèmes d'IA

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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

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Contents

Page

Foreword ..... **v**
Introduction ..... **vi**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Abbreviated terms **2**
5 Key concepts **2**
5.1 General 2
5.2 AI system concepts 4
5.3 AI system life cycle model 4
5.4 Process concepts 7
5.4.1 Criteria for processes 7
5.4.2 Description of processes 7
5.4.3 Conformance 8
6 AI System life cycle processes **8**
6.1 Agreement processes 8
6.1.1 Acquisition process 8
6.1.2 Supply process 8
6.2 Organizational project-enabling processes 9
6.2.1 Life cycle model management process 9
6.2.2 Infrastructure management process 9
6.2.3 Portfolio management process 9
6.2.4 Human resource management process 10
6.2.5 Quality management process 10
6.2.6 Knowledge management process 11
6.3 Technical management processes 11
6.3.1 Project planning process 11
6.3.2 Project assessment and control process 12
6.3.3 Decision management process 13
6.3.4 Risk management process 13
6.3.5 Configuration management process 15
6.3.6 Information management process 16
6.3.7 Measurement process 16
6.3.8 Quality assurance process 16
6.4 Technical processes 17
6.4.1 Business or mission analysis process 17
6.4.2 Stakeholder needs and requirements definition process 18
6.4.3 System requirements definition process 19
6.4.4 System architecture definition process 20
6.4.5 Design definition process 20
6.4.6 System analysis process 20
6.4.7 Knowledge acquisition process 20
6.4.8 AI data engineering process 21
6.4.9 Implementation process 24
6.4.10 Integration process 26
6.4.11 Verification process 26
6.4.12 Transition process 27
6.4.13 Validation process 28
6.4.14 Continuous validation process 29
6.4.15 Operation process 30
6.4.16 Maintenance process 31
6.4.17 Disposal process 33

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Annex A (informative) **Observations based on use cases in ISO/IEC TR 24030** **34**
Bibliography **38**

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Foreword

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Introduction

Artificial intelligence (AI) systems in the fields of computer vision and image recognition, natural language processing, fraud detection, automated vehicles, predictive maintenance and planning have achieved remarkable successes. To build and maintain an AI system, it is an efficient approach to extend the life cycle processes for a traditional software system to include AI-specific life cycle characteristics.

An example of such a specific characteristic of an AI system life cycle is where a system employs machine learning (ML) using training data and it becomes necessary to retrain the ML model using new training data that is more representative of current production data.

ISO/IEC/IEEE 12207 describes software life cycle processes and ISO/IEC/IEEE 15288 describes system life cycle processes. While these life cycle processes are broadly applicable to AI systems, they require the introduction of new processes and the modification of existing processes to accommodate the characteristics of AI systems. This document extends the current generic life cycle process International Standards to make them applicable for AI systems so that the AI system life cycle can benefit from established models and existing practices. Some AI systems are in use in areas which are related to safety, such as health care or traffic control. Such safety critical AI systems need special attention and considerations as described in ISO/IEC TR 5469 [5].

Integrating the AI system life cycle into existing processes delivers efficiency gains, better adoption of AI and mutual understanding among AI system stakeholders as defined in ISO/IEC 22989. Such an integrated life cycle approach embraces the fact that AI systems typically are a combination of AI-specific elements and traditional elements such as source code and databases.

This document provides further details on AI system life cycle processes as discussed in ISO/IEC 42001[18].

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Information technology — Artificial intelligence — AI system life cycle processes

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1 Scope

This document defines a set of processes and associated concepts for describing the life cycle of AI systems based on machine learning and heuristic systems. It is based on ISO/IEC/IEEE 15288 and ISO/IEC/IEEE 12207 with modifications and additions of AI-specific processes from ISO/IEC 22989 and ISO/IEC 23053.

This document provides processes that support the definition, control, management, execution and improvement of the AI system in its life cycle stages. These processes can also be used within an organization or a project when developing or acquiring AI systems. When an element of an AI system is traditional software or a traditional system, the software life cycle processes in ISO/IEC/IEEE 12207 and the system life cycle processes in ISO/IEC/IEEE 15288 can be used to implement that element.

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/IEC/IEEE 15288:2023, *Systems and software engineering — System life cycle processes*

ISO/IEC/IEEE 12207:2017, *Systems and software engineering — Software life cycle processes*

ISO/IEC 22989:2022, *Information technology — Artificial intelligence — Artificial intelligence concepts and terminology*

ISO/IEC 23053, *Framework for Artificial Intelligence (AI) Systems Using Machine Learning (ML)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 22989, ISO/IEC 23053, ISO/IEC/IEEE 15288, ISO/IEC/IEEE 12207 and the following 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
knowledge acquisition
process of locating, collecting, and refining knowledge and converting it into a form that can be further processed by a knowledge-based system

Note 1 to entry: Knowledge acquisition normally implies the intervention of a knowledge engineer, but it is also an important component of machine learning.

[SOURCE: ISO/IEC 2382:2015, 2123777, modified — Notes 2 to entry 3 to entry have been deleted.]

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