

INTERNATIONAL
STANDARD

ISO/
IEC/IEEE
24748-9

First edition
2023-05

**Systems and software engineering —
Life cycle management —**

Part 9:

**Application of system and software
life cycle processes in epidemic
prevention and control systems**

Ingénierie des systèmes et du logiciel — Gestion du cycle de vie —

*Partie 9: Application des processus du cycle de vie des systèmes et
du logiciel dans les systèmes de prévention et de lutte contre les
épidémies*



Reference number
ISO/IEC/IEEE 24748-9:2023(E)

© ISO/IEC 2023
© IEEE 2023



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2023
© IEEE 2023

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 or IEEE at the respective 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
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Institute of Electrical and Electronics Engineers, Inc
3 Park Avenue, New York
NY 10016-5997, USA

Email: stds.ipr@ieee.org
Website: www.ieee.org

Published in Switzerland

Contents

| | Page |
|---|----------|
| Foreword..... | v |
| Introduction..... | vi |
| 1 Scope..... | 1 |
| 2 Normative references..... | 1 |
| 3 Terms, definitions, and abbreviated terms..... | 1 |
| 3.1 Terms and definitions..... | 1 |
| 3.2 Abbreviated terms..... | 2 |
| 4 Conformance..... | 3 |
| 4.1 Intended usage..... | 3 |
| 4.2 Full conformance..... | 3 |
| 4.2.1 Full conformance to outcomes..... | 3 |
| 4.2.2 Full conformance to tasks..... | 3 |
| 4.3 Tailored conformance..... | 3 |
| 5 Key concepts and application..... | 3 |
| 5.1 General..... | 3 |
| 5.2 System concepts..... | 4 |
| 5.2.1 System..... | 4 |
| 5.2.2 Characteristics of systems for epidemic emergency..... | 4 |
| 5.2.3 System structure..... | 6 |
| 5.2.4 Interfacing, enabling, and interoperating systems..... | 7 |
| 5.2.5 Concepts related to the system solution context..... | 7 |
| 5.2.6 Product line engineering (PLE)..... | 7 |
| 5.3 Organization and project concepts..... | 7 |
| 5.3.1 Organizations..... | 7 |
| 5.3.2 Organization and project-level adoption..... | 7 |
| 5.3.3 Organization and collaborative activities..... | 7 |
| 5.4 Life cycle concepts..... | 7 |
| 5.4.1 System life cycle model..... | 7 |
| 5.4.2 System life cycle stages..... | 7 |
| 5.5 Process concepts..... | 9 |
| 5.5.1 Criteria for processes..... | 9 |
| 5.5.2 Description of processes..... | 9 |
| 5.5.3 General characteristics of processes..... | 9 |
| 5.5.4 Characteristics of life cycle processes for epidemic emergency systems..... | 9 |
| 5.6 Processes in this document..... | 10 |
| 5.6.1 General..... | 10 |
| 5.6.2 Agreement processes..... | 10 |
| 5.6.3 Organizational project-enabling processes..... | 10 |
| 5.6.4 Technical management processes..... | 10 |
| 5.6.5 Technical processes..... | 10 |
| 5.7 System-of-interest concepts..... | 10 |
| 5.7.1 General..... | 10 |
| 5.7.2 Relationships between software and system..... | 10 |
| 5.8 System of systems concepts..... | 11 |
| 5.8.1 General..... | 11 |
| 5.8.2 Differences between systems and SoS..... | 11 |
| 5.8.3 Managerial and operational independence..... | 11 |
| 5.8.4 Taxonomy of SoS..... | 11 |
| 5.8.5 SoS considerations in life cycle stages of a system..... | 11 |
| 5.8.6 Epidemic prevention and control system as an SoS..... | 11 |
| 5.9 Process application..... | 12 |
| 5.9.1 Overview..... | 12 |

| | | |
|---|---|-----------|
| 5.9.2 | Process iteration, recursion, and concurrency | 13 |
| 5.9.3 | Process views | 13 |
| 5.10 | Concept and system definition | 13 |
| 5.11 | Assurance and quality characteristics | 13 |
| 5.12 | Process reference model | 13 |
| 6 | System life cycle processes | 14 |
| 6.1 | Agreement processes | 14 |
| 6.1.1 | Acquisition process | 14 |
| 6.1.2 | Supply process | 14 |
| 6.2 | Organizational project-enabling processes | 15 |
| 6.2.1 | Life cycle model management process | 15 |
| 6.2.2 | Infrastructure management process | 15 |
| 6.2.3 | Portfolio management process | 16 |
| 6.2.4 | Human resource management process | 17 |
| 6.2.5 | Quality management process | 17 |
| 6.2.6 | Knowledge management process | 18 |
| 6.3 | Technical management processes | 18 |
| 6.3.1 | Project planning process | 18 |
| 6.3.2 | Project assessment and control process | 19 |
| 6.3.3 | Decision management process | 19 |
| 6.3.4 | Risk management process | 20 |
| 6.3.5 | Configuration management process | 21 |
| 6.3.6 | Information management process | 21 |
| 6.3.7 | Measurement process | 22 |
| 6.3.8 | Quality assurance process | 22 |
| 6.4 | Technical processes | 23 |
| 6.4.1 | Business or mission analysis process | 23 |
| 6.4.2 | Stakeholder needs and requirements definition process | 24 |
| 6.4.3 | System requirements definition process | 25 |
| 6.4.4 | Architecture definition process | 26 |
| 6.4.5 | Design definition process | 27 |
| 6.4.6 | System analysis process | 28 |
| 6.4.7 | Implementation process | 28 |
| 6.4.8 | Integration process | 29 |
| 6.4.9 | Verification process | 30 |
| 6.4.10 | Transition process | 31 |
| 6.4.11 | Validation process | 32 |
| 6.4.12 | Operation process | 32 |
| 6.4.13 | Maintenance process | 33 |
| 6.4.14 | Disposal process | 34 |
| Annex A (informative) Issues and concerns of stakeholders in the application of lifecycle processes to epidemic prevention and control systems | | 35 |
| Bibliography | | 41 |
| IEEE notices and abstract | | 42 |

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 ISO/IEC documents 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).

IEEE Standards documents are developed within the IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Association (IEEE-SA) Standards Board. The IEEE develops its standards through a consensus development process, approved by the American National Standards Institute, which brings together volunteers representing varied viewpoints and interests to achieve the final product. Volunteers are not necessarily members of the Institute and serve without compensation. While the IEEE administers the process and establishes rules to promote fairness in the consensus development process, the IEEE does not independently evaluate, test, or verify the accuracy of any of the information contained in its standards.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents) or the IEC list of patent declarations received (see <https://patents.iec.ch>).

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. In the IEC, see www.iec.ch/understanding-standards.

ISO/IEC/IEEE 24748-9 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*, in cooperation with the Systems and Software Engineering Standards Committee of the IEEE Computer Society, under the Partner Standards Development Organization cooperation agreement between ISO and IEEE.

A list of all parts in the ISO/IEC/IEEE 24748 series can be found on the ISO and IEC website.

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

Many areas have adopted information-based prevention and control measures during an epidemic and have developed numerous epidemic prevention and control systems and software. Most of the processes in the entire life cycle of the epidemic prevention and control systems are likely to be completed in the event of an epidemic. Compared with the normal state, there can be special situations such as poor communication, caused by the need for personnel to maintain a safe distance, and limited transportation and logistics services. The result can be insufficient infrastructure protection, short delivery cycles, frequent iterative upgrades, and special requirements such as accuracy, disaster tolerance, degradation capability, safety, user capacity and stress testing, and rapid demand capture. In the development process of epidemic prevention and control systems, the application of the life cycle processes specified in ISO/IEC/IEEE 15288 and ISO/IEC/IEEE 12207 can effectively help guide the process management and application of epidemic prevention and control systems.

However, for effective and efficient application of system and software life cycle processes on epidemic prevention and control systems, additional application requirements are needed. Requirements specific to the use of the epidemic prevention and control systems that facilitate effective implementation depend on the nature and severity of the epidemic and are not detailed in this document.

This document is consistent with life cycle processes of ISO/IEC/IEEE 15288 or ISO/IEC/IEEE 12207 for application on epidemic prevention and control systems, to help ensure the correct application of stakeholders' requirements for epidemic prevention and control systems. This document includes the required outputs and associated attributes.

Systems and software engineering — Life cycle management —

Part 9:

Application of system and software life cycle processes in epidemic prevention and control systems

1 Scope

This document provides requirements and guidance on the application of system and software engineering processes to systems for epidemic prevention and control.

This document provides guidance that can be employed for adopting and applying system and software life cycle processes within an organization or a project in an epidemic emergency. It includes system of systems considerations in the context of epidemic emergency.

This document applies to acquisition, supply, development, operation, maintenance, and disposal (whether performed internally or externally to an organization) of system or system of systems in an epidemic emergency.

Many of the requirements and recommendations in this document are also applicable to other systems developed rapidly to respond to emergency conditions affecting the public.

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 12207:2017, *Systems and software engineering — Software life cycle processes*

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

ISO/IEC/IEEE 15289, *Systems and software engineering — Content of life-cycle information items (documentation)*