

INTERNATIONAL  
STANDARD

ISO/IEC/  
IEEE  
24748-4

First edition  
2016-05-15

---

---

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

Part 4:  
**Systems engineering planning**

*Ingénierie des systèmes — Gestion du cycle de vie —  
Partie 4: Ingénierie des systèmes*



Reference number  
ISO 24748-4:2016(E)

© ISO/IEC 2016  
© IEEE 2016



**COPYRIGHT PROTECTED DOCUMENT**

© ISO/IEC 2016

© IEEE 2016

Published in Switzerland

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

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

IEC Central Office  
3, rue de Varembé  
CH-1211 Geneva 20  
Switzerland  
E-mail [inmail@iec.ch](mailto:inmail@iec.ch)  
Web [www.iec.ch](http://www.iec.ch)

Institute of Electrical and  
Electronics Engineers, Inc.  
3 Park Avenue, New York  
NY 10016-5997, USA  
E-mail [stds.ipr@ieee.org](mailto:stds.ipr@ieee.org)  
Web [www.ieee.org](http://www.ieee.org)

# Contents

Page

Foreword .....	V
Introduction.....	ix
<b>1</b> <b>Scope</b> .....	<b>1</b>
<b>2</b> <b>Conformance</b> .....	<b>2</b>
<b>2.1</b> <b>Intended usage</b> .....	<b>2</b>
<b>2.2</b> <b>Conformance to processes</b> .....	<b>2</b>
<b>2.3</b> <b>Conformance to information item content</b> .....	<b>2</b>
<b>2.4</b> <b>Full conformance</b> .....	<b>2</b>
<b>2.5</b> <b>Tailored conformance</b> .....	<b>3</b>
<b>3</b> <b>Normative references</b> .....	<b>3</b>
<b>4</b> <b>Terms and definitions</b> .....	<b>3</b>
<b>5</b> <b>Concepts</b> .....	<b>5</b>
<b>5.1</b> <b>Introduction</b> .....	<b>5</b>
<b>5.2</b> <b>System concepts</b> .....	<b>6</b>
<b>5.3</b> <b>Life cycle concepts</b> .....	<b>6</b>
<b>5.4</b> <b>Process concepts</b> .....	<b>6</b>
<b>5.5</b> <b>Organizational concepts</b> .....	<b>7</b>
<b>5.6</b> <b>Project concepts</b> .....	<b>7</b>
<b>5.7</b> <b>Information items concepts</b> .....	<b>7</b>
<b>5.8</b> <b>SEMP development concepts</b> .....	<b>8</b>
<b>6</b> <b>Technical management processes for systems engineering planning</b> .....	<b>9</b>
<b>6.1</b> <b>General</b> .....	<b>9</b>
<b>6.2</b> <b>Project planning process</b> .....	<b>10</b>
<b>6.3</b> <b>Project assessment and control process</b> .....	<b>14</b>
<b>6.4</b> <b>Decision management process</b> .....	<b>16</b>
<b>6.5</b> <b>Risk management process</b> .....	<b>18</b>
<b>6.6</b> <b>Configuration management process</b> .....	<b>19</b>
<b>6.7</b> <b>Information management process</b> .....	<b>20</b>
<b>6.8</b> <b>Measurement process</b> .....	<b>21</b>
<b>6.9</b> <b>Quality assurance process</b> .....	<b>22</b>
<b>7</b> <b>Information items</b> .....	<b>23</b>
<b>8</b> <b>Guidelines for information items</b> .....	<b>23</b>
<b>8.1</b> <b>Introduction</b> .....	<b>23</b>
<b>8.2</b> <b>Adaptation of ISO/IEC/IEEE 15288</b> .....	<b>24</b>
<b>8.3</b> <b>Elements of the SEMP</b> .....	<b>26</b>
<b>9</b> <b>Information item content</b> .....	<b>27</b>
<b>9.1</b> <b>General</b> .....	<b>27</b>
<b>9.2</b> <b>Front matter</b> .....	<b>28</b>
<b>9.3</b> <b>Technical Project Summary</b> .....	<b>28</b>
<b>9.3.1</b> <b>General</b> .....	<b>28</b>
<b>9.3.2</b> <b>Purpose, scope and objectives</b> .....	<b>28</b>
<b>9.3.3</b> <b>Assumptions and constraints</b> .....	<b>29</b>
<b>9.3.4</b> <b>System description</b> .....	<b>29</b>
<b>9.3.5</b> <b>Schedule and budget summary</b> .....	<b>29</b>
<b>9.4</b> <b>References</b> .....	<b>29</b>
<b>9.5</b> <b>Definitions</b> .....	<b>29</b>

ISO/IEC/IEEE 24748-4:2016(E)

9.6 Technical project organization..... 29

9.7 Planning for technical definition ..... 30

9.7.1 General..... 30

9.7.2 Process definition ..... 30

9.7.3 Infrastructure planning ..... 31

9.7.4 Technical project planning ..... 31

9.8 Technical project execution and control..... 33

9.8.1 Performance assessment and control ..... 33

9.8.2 Measurement..... 34

9.8.3 Quality assurance ..... 34

9.8.4 Reviews and audits..... 34

9.8.5 Subcontractor management ..... 35

9.8.6 Project management controls ..... 35

9.8.7 Technical project closeout ..... 35

9.8.8 Technical baseline management..... 36

9.9 Supporting process plans ..... 38

9.9.1 General..... 38

9.9.2 Decision management..... 38

9.9.3 Risk management ..... 39

9.9.4 Communications ..... 39

9.9.5 Verification and validation ..... 39

9.10 Specialty engineering activities and plans ..... 40

Annex A (informative) Project Management Plan (PMP) elements ..... 42

Relationship of ISO/IEC/IEEE 24748-4 SEMP content to ISO/IEC 16326 PMP content ..... 42

Annex B (informative) SEMP considerations for system life cycle stages ..... 49

B.1 Introduction ..... 49

B.2 Concept stage ..... 52

B.3 Development stage ..... 53

B.4 Production stage..... 54

B.5 Utilization stage ..... 55

B.6 Support stage..... 56

B.7 Retirement stage..... 57

Annex C (normative) Tailoring policies ..... 59

C.1 Introduction ..... 59

C.2 Information item tailoring process..... 59

C.2.1 Purpose..... 59

C.2.2 Outcomes ..... 59

C.2.3 Activities and tasks ..... 59

Bibliography ..... 61

## 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. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of ISO/IEC JTC 1 is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is called to the possibility that implementation of this standard may require the use of subject matter covered by patent rights. By publication of this standard, no position is taken with respect to the existence or validity of any patent rights in connection therewith. ISO/IEEE is not responsible for identifying essential patents or patent claims for which a license may be required, for conducting inquiries into the legal validity or scope of patents or patent claims or determining whether any licensing terms or conditions provided in connection with submission of a Letter of Assurance or a Patent Statement and Licensing Declaration Form, if any, or in any licensing agreements are reasonable or non-discriminatory. Users of this standard are expressly advised that determination of the validity of any patent rights, and the risk of infringement of such rights, is entirely their own responsibility. Further information may be obtained from ISO or the IEEE Standards Association.

ISO/IEC/IEEE 24748-4 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Systems and software engineering*, in cooperation with the IEEE Computer Society Systems and Software Engineering Standards Committee, under the Partner Standards Development Organization cooperation agreement between ISO and IEEE.

This edition cancels and replaces the first edition of ISO/IEC 26702:2007 – IEEE Std 1220-2005, which has been technically revised.

ISO/IEC 24748 consists of the following parts, under the general title *Systems and software engineering — Life cycle management*:

- *Part 1: Guide for life cycle management*
- *Part 2: Guide to the application of ISO/IEC 15288 (System life cycle processes)*
- *Part 3: Guide to the application of ISO/IEC 12207 (Software life cycle processes)*

**ISO/IEC/IEEE 24748-4:2016(E)**

- *Part 4: Systems engineering planning*
- *Part 5: Software development planning*

## Introduction

ISO/IEC/IEEE 15288, *Systems and software engineering – System life cycle processes*, provides a common process framework covering the life cycle of man-made systems. This life cycle spans the conception of ideas through to the retirement of a system. It provides the processes for acquiring and supplying systems. In addition, this framework provides for the assessment and improvement of the life cycle processes. This common framework improves communication and cooperation among the parties that create, utilize, and manage modern systems in order that they can work in an integrated, coherent fashion.

The acquisition or supply of a system is usually done within a project. A project prepares and implements the technical plans and schedules necessary to guide the project toward accomplishment of its objectives and proper conclusion. Given the project's authorization and objectives, the project should establish a Systems Engineering Management Plan (SEMP).

This part of ISO/IEC/IEEE 24748 replaces the former ISO/IEC 26702:2007 (IEEE Std 1220-2005), *Systems engineering — Application and management of the systems engineering process*. In preparation for harmonization, ISO/IEC 26702 provided explanations regarding key differences between IEEE Std 1220 and ISO/IEC/IEEE 15288 in areas such as terminology and structure.

The evolution of the harmonized set of ISO/IEC/IEEE 15288-12207 related standards and technical reports that are discussed in this part of ISO/IEC/IEEE 24748 provides detailed requirements and guidance on the application of system life cycle processes. This part of ISO/IEC/IEEE 24748 unifies technical and management requirements and guidance from several of these sources to specify the requirements for the content of a SEMF and to provide a common SEMF format. This part of ISO/IEC/IEEE 24748 also identifies the processes as defined in ISO/IEC/IEEE 15288 to perform the necessary project planning activities to accomplish the project's technical effort and to develop the project's SEMF. Due to close alignment with the content of ISO/IEC 24748, ISO/IEC 26702 is now Part 4 of the multi-part International Standard, ISO/IEC 24748 (*Systems and software engineering – Life cycle management*).

Taken together, the parts of ISO/IEC 24748 are intended to facilitate the joint usage of the process content of ISO/IEC/IEEE 15288 and ISO/IEC 12207, *Systems and software engineering – Software life cycle processes*, which in turn may be used together with related standards such as for service management, and various other lower-level process standards. In this way, ISO/IEC 24748 provides unified and consolidated guidance on the life cycle management of systems and software. Its purpose is to help ensure consistency in system concepts and life cycle concepts, models, stages, processes, process application, key points of view, adaptation, and use in various domains as the two International Standards (and others) are used in combination. It should help a project to design a life cycle model for managing progress on a project.

The five parts of ISO/IEC 24748 are:

- ISO/IEC TR 24748-1: *Systems and software engineering – Life cycle management – Part 1: Guide for life cycle management*
- ISO/IEC TR 24748-2: *Systems and software engineering – Life cycle management – Part 2: Guide for the application of ISO/IEC 15288 (System life cycle processes)*
- ISO/IEC TR 24748-3: *Systems and software engineering – Life cycle management – Part 3: Guide for the application of ISO/IEC 12207 (Software life cycle processes)*
- ISO/IEC/IEEE 24748-4: *Systems and software engineering – Life cycle management – Part 4: Systems engineering planning*

## ISO/IEC/IEEE 24748-4:2016(E)

— ISO/IEC/IEEE 24748-5: *Systems and software engineering – Life cycle management – Part 5: Software development planning*

Whereas Part 1 addresses in generic terms the purpose stated above of guidance for the life cycle management of systems and software, Part 2 focuses on and expands the coverage of those aspects for systems. Part 2 will also, in conjunction with Part 1, aid in identifying and planning the use of the life cycle processes described in ISO/IEC/IEEE 15288. The proper use of these processes will contribute to a project being completed successfully, meeting its objectives and requirements for each stage and for the overall project.

This part of ISO/IEC/IEEE 24748 focuses on the processes required for successful planning and management of the project's systems engineering effort. It calls for development of a SEMP as the key vehicle for representing a project's application of systems life cycle processes. The SEMP is a top level technical planning document for a project which addresses Technical Management processes established by three principal sources (the project's contract or agreement, applicable organizational processes, and the systems engineering project team) as necessary to successfully accomplish the systems engineering-related tasks of the project. The terms technical planning and systems engineering planning are used interchangeably in this part of ISO/IEC/IEEE 24748 to emphasize or differentiate technical contributions in the processes under discussion. This part of ISO/IEC/IEEE 24748 draws on key aspects of the former ISO/IEC 26702 (IEEE 1220) to highlight additional practices and provide normative content for a SEMP.



# Systems and software engineering — Life cycle management — Part 4: Systems engineering planning

## 1 Scope

This part of ISO/IEC/IEEE 24748

- specifies the Technical Management processes from ISO/IEC/IEEE 15288 that are required to be implemented for planning a systems engineering project,
- gives guidelines for applying the required processes,
- specifies a required information item, a plan for the technical management and execution of the project that is to be produced through the implementation of the Project Planning process,
- gives guidelines for the format and content of the required information item, and
- provides normative definition of the content of the information item that results from the application of these processes to that end. In this part of ISO/IEC/IEEE 24748 that plan for technical project management is termed the Systems Engineering Management Plan (SEMP).

This part of ISO/IEC/IEEE 24748 is applicable to

- those who use or plan to use ISO/IEC/IEEE 15288 on projects dealing with man-made systems including software-intensive systems, software products, and services related to those systems and products,
- those who are responsible for the technical management of projects concerned with the engineering of systems,
- those responsible for executing ISO/IEC/IEEE 15288 system life cycle processes at a project level,
- organizations and individuals who are subcontracting a project management effort,
- anyone developing engineering management documentation to complete technical planning aspects of their project's processes.

In many organizations, the various responsibilities of technical management are assigned to more than one person. Where the term "technical manager" or "systems engineering manager" is used in this part of ISO/IEC/IEEE 24748, the guidance, advice or normative requirement applies to the applicable role within the project or organization.

This part of ISO/IEC/IEEE 24748 is intended to provide guidance for two-party situations and may be equally applied where the two parties are from the same organization. This part of ISO/IEC/IEEE 24748 can also be used by a single party as self-imposed tasks.

This part of ISO/IEC/IEEE 24748 can also serve as guidance in multi-party situations, where high risks are inherent in the supply and integration of complex systems, and procurement can involve several suppliers, organizations or parties.

## 2 Conformance

### 2.1 Intended usage

This part of ISO/IEC/IEEE 24748 provides guidance for the execution of the ISO/IEC/IEEE 15288 processes that are required for planning and managing a project to implement a significant systems engineering effort. This part of ISO/IEC/IEEE 24748 also provides normative definition of the content and recommendations for the format of the related information item, the project's SEMP.

Users of this part of ISO/IEC/IEEE 24748 can claim conformance to the process provisions or to the information item provisions, or both.

The requirements in this part of ISO/IEC/IEEE 24748 are contained in 6.1, Clauses 7 and 9 and in Annex C.

### 2.2 Conformance to processes

This part of ISO/IEC/IEEE 24748 identifies required processes for planning the technical management and execution of projects that implement considerable systems engineering efforts regarding the project's system products.

The requirements for these processes in this part of ISO/IEC/IEEE 24748 are contained in 6.1.

If a user of this part of ISO/IEC/IEEE 24748 claims full conformance to ISO/IEC/IEEE 15288:2015, then by implication the user may claim conformance to the processes in this part of ISO/IEC/IEEE 24748.

NOTE A claim to tailored conformance to ISO/IEC/IEEE 15288:2015, does not necessarily imply conformance to the processes in this part of ISO/IEC/IEEE 24748.

### 2.3 Conformance to information item content

This part of ISO/IEC/IEEE 24748 provides the requirements for an information item – the SEMP.

A claim of conformance to the information item provisions of this part of ISO/IEC/IEEE 24748 means that

- the user produces the required information item stated in this part of ISO/IEC/IEEE 24748, and
- the user demonstrates that the information item produced during the project planning activities conforms to the content requirements defined in this part of ISO/IEC/IEEE 24748.

The requirements for the information item in this part of ISO/IEC/IEEE 24748 are contained in Clause 7.

The requirements for the content of the information item in this part of ISO/IEC/IEEE 24748 are contained in Clause 9.

NOTE 1 If a user of this part of ISO/IEC/IEEE 24748 claims full conformance to ISO/IEC/IEEE 15289, it does not imply that the user may claim conformance to the information items and information item content in this part of ISO/IEC/IEEE 24748. The reason is that this part of ISO/IEC/IEEE 24748 adds additional information items and additional detail.

NOTE 2 In this part of ISO/IEC/IEEE 24748, for simplicity of reference, an information item is described as if it were published as a separate document. However, information items will be considered as conforming if they are unpublished but available in a repository for reference, or divided into separate documents or volumes.

### 2.4 Full conformance

A claim of full conformance to this part of ISO/IEC/IEEE 24748 is equivalent to claiming conformance

- to the processes of ISO/IEC/IEEE 15288, cited in subclause 6.1,

- to the information item cited in Clause 7, and
- to content requirements of the information item in Clause 9.

## 2.5 Tailored conformance

A claim of tailored conformance to this part of ISO/IEC/IEEE 24748 is equivalent to claiming conformance in accordance with the tailoring direction provided in normative Annex C.

## 3 Normative references

The following document, in whole or in part, is normatively referenced in this document and is indispensable for its application. 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 15288:2015, *Systems and software engineering – System life cycle processes*