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Australian/New Zealand Standard™

Systems and software engineering — Guidelines for the utilization of ISO/IEC/ IEEE 15288 in the context of system of systems (SoS)



AS/NZS ISO/IEC/IEEE 21840:2021

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- Engineers Australia
- Griffith University
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Preface

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee IT-015, Software and Systems Engineering.

The objective of this document is to provide guidance on the application of processes in AS/NZS ISO/IEC/IEEE 15288 to systems of systems (SoS). The scope of this document is the same as AS/NZS ISO/IEC/IEEE 15288, which addresses more than systems engineering activities.

This document provides general guidance for each ISO/IEC/IEEE 15288 process and process outcome in the context of SoS, but it does not address specific activities, tasks, methods, or procedures. Additional processes and process outcomes unique to SoS can still be needed and are not covered by this document.

This document explores the similarities and differences between systems and SoS and, by extension, the similarities and differences between engineering of systems and SoS. The guidance contained in this document is expected to evolve as the discipline matures.

This document is identical with, and has been reproduced from, ISO/IEC/IEEE 21840:2019, *Systems and software engineering — Guidelines for the utilization of ISO/IEC/IEEE 15288 in the context of system of systems (SoS)*.

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The terms “normative” and “informative” are used in Standards to define the application of the appendices or annexes to which they apply. A “normative” appendix or annex is an integral part of a Standard, whereas an “informative” appendix or annex is only for information and guidance.

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Foreword

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

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the rules given in the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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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.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Systems and software 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.

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.

Introduction

Application of systems engineering to systems of systems has become increasingly important for the realization and sustainability of large and persistent sociotechnical systems in domains as varied as healthcare, transportation, energy, and defense, and contexts such as corporations, cities, and government. This has been intensified in the last fifteen years by the pervasiveness of information technology (IT), illustrated by new technologies and paradigms such as Sensor Networks, Cloud Computing, the Internet of Things, Big Data, Smart Devices and Ambient Intelligence. It is, for instance, the application of these technologies to cities that transform them into smarter cities.

This document provides guidance for the utilization of ISO/IEC/IEEE 15288 in the context of SoS. While ISO/IEC/IEEE 15288 applies to systems in general (including constituent systems), this document provides guidance on the application of these processes to the special case of SoS. However, ISO/IEC/IEEE 21840 is not a self-contained SoS replacement for ISO/IEC/IEEE 15288. This document is intended to be used in conjunction with ISO/IEC/IEEE 15288, ISO/IEC/IEEE 21839 and ISO/IEC/IEEE 21841 and is not intended to be used without them.

For example, ISO/IEC/IEEE 21841 provides a taxonomy for SoS, providing specific viewpoints that align with stakeholder concerns. Using a taxonomy in conjunction with this document facilitates better communications among the various stakeholders that are involved in activities like governance, engineering, operation, and management of these SoS. However, this document does not require the use of any specific taxa in ISO/IEC/IEEE 21841.

Australian/New Zealand Standard

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1 Scope

This document provides guidance on the application of processes in ISO/IEC/IEEE 15288 to systems of systems (SoS). The scope of this document is the same as ISO/IEC/IEEE 15288, which addresses more than systems engineering activities.

NOTE 1 Throughout the document, there is mixed use of "system of systems" and "systems of systems". "SoS" could refer to a system of systems or systems of systems. Similarly, "CS" could refer to a constituent system or constituent systems.

This document provides general guidance for each ISO/IEC/IEEE 15288 process and process outcome in the context of SoS, but it does not address specific activities, tasks, methods, or procedures. Additional processes and process outcomes unique to SoS can still be needed and are not covered by this document.

This document explores the similarities and differences between systems and SoS and, by extension, the similarities and differences between engineering of systems and SoS. The guidance contained in this document is expected to evolve as the discipline matures.

NOTE 2 In many cases, this document notes that ISO/IEC/IEEE 15288 processes or process outcomes "... applies as stated to SoS." Some interpretation within the context of SoS can still be needed.

2 Normative References

There are no normative references in this document.

3 Terms, definitions, and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

NOTE For additional terms and definitions in the field of systems and software engineering, see ISO/IEC/IEEE 24765, which is published periodically as a "snapshot" of the SEVOCAB (Systems and software Engineering Vocabulary) database and which is publicly accessible at www.computer.org/sevocab.

ISO, IEC, and IEEE maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/>
- IEC Electropedia: available at <http://www.electropedia.org/>
- IEEE Standards Dictionary Online: available at: <http://dictionary.ieee.org>

3.1.1 capability

measure of capacity and the ability of an entity (*system* (3.1.8), person or organization) to achieve its objectives

[SOURCE: ISO/IEC 19770-1:2017, 3.10, modified — Note 1 to entry has been removed.]