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ISO/IEC JTC1/SC7

Software and Systems Engineering

Dr. Sundeep Oberoi
SC 7 Chair

> *There is a quite a bit of software in everything now and everything is either a system in itself or part of a larger system. The resilience of these systems and their underlying technologies depend largely on the right application of software & systems engineering principles.*

Dear Readers,

Thanks for reading the brochure of ISO/IEC JTC 1 SC 7, Subcommittee on Software & Systems Engineering. One of the oldest subcommittees formed under JTC 1 in 1987 which is increasingly becoming more relevant with its fascinating standards that cover the entire software and system development life cycle.

Software is now ubiquitous and an extremely important element in almost any technology and technology based systems. The market demand for quickly produced, reliable yet easily modifiable, globally accessible yet managed and controlled software and systems is making a significant demand on the software and systems engineering community. The scope of SC 7 includes:

- Standardization that covers the processes, supporting tools and supporting technologies for the engineering of software products and systems.
- Produce generic standards that are technology agnostics and independent of the application domain. These standards are principally focused on process models and good practices (methods and techniques).

ISO/IEC/JTC 1/SC 7 has considered the current market trends and understood that businesses are under significant pressure to digitally transform themselves. These represent software and systems engineering challenges on a grand scale. Addressing the market needs and the engineering challenges, ISO/IEC JTC 1 SC 7 has put its focus on areas and created its work program accordingly.

And since we want all of our readers (standard developers) and potential users of SC 7 standards to get a bird's eye view of what is available in the SC 7 repository, this brochure has been created with details of our structure, scope and brief on key flagship standards. It will help in decision making with respect to collaboration or usage and both are welcome.

Please feel free to reach out to me / secretariat / communications group with any idea of collaboration or help.

Sincerely,
Dr. Sundeep Oberoi

Reena Garg

SC 7 Committee Manager

> One of the oldest SCs in JTC 1, our collection of standards serve one or the other components of software and systems life cycle. It serves as strong foundation for software and systems engineering. We are open to collaboration for further development of the existing standards or work on new standards development jointly. My email ID is below and feel free to reach out.

Secretariat

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Anupam Agrawal

Convenor SC 7 AG 3
Communication and Outreach

> The subcommittee understands the need to delight its stakeholders in the entire ecosystem of software systems or system of systems. The experts herein have created a huge body of knowledge over the years. It's time not to reinvent but reuse the foundational standards of software and system engineering for further development of ICT. We are reaching out to various standards developing organizations (SDOs) and stakeholder communities for engaging with us.

www.iso.org/committee/45086.html

https://go.iec.ch/jtc1sc7

@JTC 1SC 7

JTC 1 SC 7 Community

ISO/IEC JTC 1/SC 7

Software and Systems Engineering Group

As of April 2020

ISO/IEC JTC1/SC7

Software and Systems Engineering

197	33	35	24
PUBLISHED ISO/IEC STANDARDS	ISO/IEC STANDARDS UNDER DEVELOPMENT	PARTICIPATING MEMBERS	OBSERVING MEMBERS

SECRETARIAT: BIS

Committee Manager: Ms Reena Garg

Chair (until end 2020): Dr Sundeep Oberoi

ISO Technical Programme Manager [TPM]: Mr. Andrew Dryden
ISO Editorial Programme Manager [EPM]: Mrs. Yvonne Chen

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www.iso.org/committee/45086.html

STRUCTURE

(Along with Flagship Standard/s)

AG 1
Chair's Advisory Group

AG 2
Business Planning Group

AG 3
Communications & Outreach

SC 7

Secretariat

AG 4
Standards Management Group

AG 5
Architecture & Future Watch

WG 2
Systems & Software Documentation
26511:2018 / 26531:2015

WG 4
Tools and Environment
26550: 2015

WG 6
Software Product Measurement and Evaluation
25000 SQuaRE

WG 7
Life cycle Management
15288:2015 / 12207: 2017

WG 10
Process Assessment
33000 / 29155-1:2017

WG 19
Techniques for Specifying IT Systems
10746

WG 20
SWEBOK and Professionalization
24773

WG 21
IT Asset Management
19770-1: 2017

WG 22
Vocabulary
24765:2017

WG 24
SLC Profiles and Guidelines for VSEs
29110-1:2016

WG 26
Software Testing
29119-1:2013

WG 42
Architecture
42010:2011

JWG 28
Common Industry Formats
25060:2010

SCOPE

Standardization of processes, supporting tools and supporting technologies for the engineering of software products and systems.

Note: The processes, tools and technologies are within the scope of JTC1 terms of references and exclude specific tools and technologies that have been assigned by JTC1 to other of its SC's.

STRUCTURE

REFERENCE	TITLE	TYPE
ISO/IEC JTC 1/SC 7/AG 1	Chair's advisory group	Advisory group
ISO/IEC JTC 1/SC 7/AG 2	Business planning group	Advisory group
ISO/IEC JTC 1/SC 7/AG 3	Communications and outreach	Advisory group
ISO/IEC JTC 1/SC 7/AG 4	Standards management	Advisory group
ISO/IEC JTC 1/SC 7/AG 5	Architecture and future watch	Advisory group
ISO/IEC JTC 1/SC 7/JWG 28	Joint ISO/IEC JTC 1/SC 7 - ISO/TC 159/SC 4 WG: Common industry formats for usability reports	Joint working group
ISO/IEC JTC 1/SC 7/WG 2	System software documentation	Working group
ISO/IEC JTC 1/SC 7/WG 4	Tools and environment	Working group
ISO/IEC JTC 1/SC 7/WG 6	Software product and system quality	Working group
ISO/IEC JTC 1/SC 7/WG 7	Life cycle management	Working group
ISO/IEC JTC 1/SC 7/WG 10	Process assessment	Working group
ISO/IEC JTC 1/SC 7/WG 19	Techniques for specifying it systems	Working group
ISO/IEC JTC 1/SC 7/WG 20	Software and systems bodies of knowledge and professionalization	Working group
ISO/IEC JTC 1/SC 7/WG 21	Information technology asset management	Working group
ISO/IEC JTC 1/SC 7/WG 22	Vocabulary validation	Working group
ISO/IEC JTC 1/SC 7/WG 24	SLC profile and guidelines for VSE	Working group
ISO/IEC JTC 1/SC 7/WG 26	Software testing	Working group
ISO/IEC JTC 1/SC 7/WG 42	Architecture	Working group

ISO/IEC JTC 1/SC 7/WG 2

System software documentation

JoAnn Hackos

Convenor

FLAGSHIP STANDARD

ISO/IEC/IEEE 26511:2018

Systems and software engineering — Requirements for managers of information for users of systems, software, and services

ISO/IEC/IEEE 26531:2015

Systems and software engineering — Content management for product life-cycle, user and service management documentation

ABOUT FLAGSHIP STANDARD

ISO/IEC/IEEE 26511:2018

This document provides an overview of the information-management processes that are specific for the management of information for users.

ISO/IEC/IEEE 26531:2015

States requirements for efficient development and management of content produced throughout the life-cycle of a system and software product; for the provision of user documentation for systems and software; for the management of IT services.

ISO/IEC JTC 1/SC 7/WG 4

Tools and environment

Dr. Dan Hyung Lee
Convenor

FLAGSHIP STANDARD

ISO/IEC 26550:2015

Software and systems engineering — Reference model for Product Line Engineering and Management

ABOUT FLAGSHIP STANDARD

Software and Systems Product Line (SSPL) engineering and management creates, exploits and manages a common platform to develop a family of products (e.g. software products, systems architectures) at lower cost, reduced time to market and with better quality. As a result, it has gained increasing global attention since the 1990s. This International Standard provides a reference model consisting of an abstract representation of the key processes of software and systems product line engineering and management and the relationships between the processes. Two key characteristics, the need for both domain and application engineering life cycle processes and the need for the explicit variability definition, differentiate product line engineering from single-system engineering.

The goal of domain engineering is to define and implement domain assets commonly used by member products within a product line, while the goal of application engineering is to develop applications by exploiting the domain assets including common and variable assets. Domain engineering explicitly defines product line variability which reflects the specific needs of different markets and market segments. Variability may be embedded in domain assets. During application engineering, the domain assets are deployed in accordance with the defined variability models.

The reference model for SSPL engineering and management can be used in subsequent standardization efforts to create standards having a high level of abstraction (e.g. product management, scoping, requirements engineering, design, realization, verification and validation, and organizational and technical management), a medium level of abstraction (e.g. configuration management, variability modelling, risk management, quality assurance, measurement, evaluation, asset repository), or a detailed level of abstraction (e.g., texture, configuration mechanism, asset mining) of SSPL engineering and management.

ISO/IEC JTC 1/SC 7/WG 6

Software Product and System Quality

Toshihiro Komiyama
Convenor

FLAGSHIP STANDARD

ISO/IEC 25000 SQuaRE series

Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE)

ABOUT FLAGSHIP STANDARD

SQuaRE is used in combination of some of standards within the series which are chosen by usage. SQuaRE is composed of the following divisions:

— ISO/IEC 2500**n - Quality Management Division**. The International Standards that form this division define all common models, terms and definitions referred to by all other standards from the SQuaRE series.

— ISO/IEC 2501**n - Quality Model Division**. The International Standards that form this division present detailed quality models for systems and software product, quality in use and data. Practical guidance on the use of the quality model is also provided.

— ISO/IEC 2502**n - Quality Measurement Division**. The International Standards that form this division include a system and software product quality measurement reference model, mathematical definitions of quality measures, and practical guidance for their application.

— ISO/IEC 2503**n - Quality Requirements Division**. The International Standard that forms this division helps specifying quality requirements.

— ISO/IEC 2504**n - Quality Evaluation Division**. The International Standards that form this division provide requirements, recommendations and guidelines for product evaluation, whether performed by independent evaluators, acquirers or developers. The support for documenting a measure as an Evaluation Module is also presented.

— ISO/IEC 25050-25099-**Extension Division**. SQuaRE extension (ISO/IEC 25050 to ISO/IEC 25099) is designated to contain system or software product quality International Standards and/or Technical Reports that address specific application domains or that can be used to complement one or more SQuaRE International Standards.

ISO/IEC JTC 1/SC 7/WG 7

Life Cycle Management

William A Bearden Jr.
Convenor

FLAGSHIP STANDARD

ISO/IEC/IEEE 15288:2015
Systems and software engineering – System life cycle processes

ISO/IEC/IEEE 12207:2017
Systems and software engineering – Software life cycle processes

ABOUT FLAGSHIP STANDARD

These two Standards provide a common process framework for describing the life cycle of systems created by humans, adopting a System/Software Engineering approach to enable the realization of systems, products and services in technology and methodology agnostic fashion. The processes focus on defining stakeholder needs and required functionality early in the development cycle, documenting requirements, and performing design synthesis and system validation while considering the complete problem. The process framework integrates all the disciplines and specialty groups into a team effort forming a structured development process that proceeds from concept to production to operation. It considers both the business and the technical needs of all stakeholders with the goal of providing a quality product that meets the needs of users and other applicable stakeholders. This life cycle spans the conception of ideas through to the retirement of a system.

ISO/IEC JTC 1/SC 7/WG 10

Process assessment

Alec Dorling
Convenor

FLAGSHIP STANDARD

ISO/IEC 33000 Family
Process assessment

ISO/IEC 29155-1:2017
Benchmarking

ABOUT FLAGSHIP STANDARD

ISO/IEC 33xxx is a family of International Standards developed by ISO that revises the ISO/IEC 15504 series of International Standards and which provides a framework for the assessment of process quality characteristics (e.g. process capability) and organizational maturity. The framework for assessment covers processes employed in the development , maintenance, and use of systems across the information technology domain and those employed in the design, transition, delivery and improvement of services. Results of assessment can be applied for improving process performance, benchmarking, or for identifying risks associated with application of the processes.

ISO/IEC 29155-1:2017 identifies a framework for information technology (IT) project performance benchmarking (e.g. development or maintenance productivity) and related aspects (e.g. data collection and software classification). The framework consists of activities and components that are necessary to successfully identify, define, select, apply, and improve benchmarking for IT project performance. It also provides definitions for IT project performance benchmarking terms, which are also applicable to other parts of the ISO/IEC 29155 series.

ISO/IEC JTC 1/SC 7/WG 19

Techniques for Specifying IT Systems

Jean Berube
Convenor

FLAGSHIP STANDARD

ISO/IEC 10746
Information technology – Open Distributed Processing

ABOUT FLAGSHIP STANDARD

The Reference Model for Open Distributed Processing (RM-ODP) is a family of International Standards created to give a solid basis for describing and building widely distributed systems and applications in a systematic way. The objective of ODP standardization is the development of International Standards that allow the benefits of distributing information processing systems and services to be realized in an environment of heterogeneous IT resources and multiple organizational domains.

The ODP framework defines essential concepts necessary to specify open distributed IT systems from five prescribed viewpoints and provides a well-developed framework for the structuring of specifications for large-scale, distributed systems. It stresses the need to build such systems with evolution in mind, by identifying the concerns of major stakeholders and then expressing the design as a series of linked viewpoints. RM-ODP is not limited to any single tool or design method but concentrates on the key choices that make an architectural design robust, flexible, and long lived.

RM-ODP consists of 14 International Standards covering all main concerns of software engineers and enterprise architects who need to design and develop heterogeneous and interoperable IT systems in a flexible but rigorous manner.

ISO/IEC JTC 1/SC 7/WG 20

Software and Systems Bodies of Knowledge and Professionalization

Prof. Hironori Washizaki

Convenor

FLAGSHIP STANDARD

ISO/IEC 24773 series

Software and systems engineering - Certification of software and systems engineering professionals

ABOUT FLAGSHIP STANDARD

ISO/IEC 24773 is a multipart standard that revises and replaces ISO/IEC 24773:2008. It contains requirements specifically related to certification of software and systems engineering professionals. It also contains guidance to certification bodies regarding the definition of knowledge, skills and competency that are to be incorporated into a certification for such professionals. It is intended to be used in combination with ISO/IEC 17024.

ISO/IEC JTC 1/SC 7/WG 21

IT Asset Management (ITAM)

Ron Brill
Convenor

FLAGSHIP STANDARD

ISO/IEC 19770-1:2017 Information technology

IT asset management — Part 1:IT asset management systems — Requirements

ABOUT FLAGSHIP STANDARD

IT Asset Management (ITAM) is defined as all of the infrastructure and processes necessary for the effective management, control and protection of IT assets within an organization throughout all stages of the life cycle. ISO/IEC 19770-1 specifies the requirements for the establishment, implementation, maintenance and improvement of a management system for ITAM, referred to as an "IT asset management system" (ITAMS). As a Management Systems Standard, ISO/IEC 19770-1 is based on the Plan-Do-Check-Act cycle. The Standard also specifies (in normative Annex A) 15 ITAM process areas that are expected within organizations, and suggests (in informative Annex B) three tiers for their recommended implementation order: Trustworthy Data, life cycle Integration, and Optimization. The standard is designed to enable an organization to align and integrate its ITAM system with related management system requirements, for example those specified by ISO/IEC 27001 and ISO/IEC 20000-1.

ISO/IEC JTC 1/SC 7/WG 22

Vocabulary validation

Annette Reilly
Convenor

FLAGSHIP STANDARD

ISO/IEC/IEEE 24765:2017

Systems and software engineering — Vocabulary

ABOUT FLAGSHIP STANDARD

ISO/IEC/IEEE 24765:2017 provides a common vocabulary applicable to all systems and software engineering work. It was prepared to collect and standardize terminology. ISO/IEC/IEEE 24765:2017 is intended to serve as a useful reference for those in the information technology field, and to encourage the use of systems and software engineering standards prepared by ISO/IEC JTC 1/SC 7 and liaison organization IEEE Computer Society. The complete vocabulary is updated periodically and freely available for search at www.computer.org/sevocab

ISO/IEC JTC 1/SC 7/WG 24

Systems and Software Life Cycle Standards and Guides for Very Small Entities

Tanin Uthayanaka
Convenor

FLAGSHIP STANDARD

ISO/IEC 29110 Series

Systems and Software Engineering Standards and Guides for Very Small Entities (VSEs)

ABOUT FLAGSHIP STANDARD

The ISO/IEC 29110 series of standards and guides was developed mainly to provide a road map for VSEs developing systems or software. The roadmap is composed of four profiles (i.e., Entry, Basic, Intermediate, and Advanced) to guide VSEs in moving from Start-ups to Grown-ups.

A profile is an assemblage of a set of elements of selected standards, such as the software life cycle processes standard ISO/IEC/IEEE 12207 or the system life cycle processes standard ISO/IEC/IEEE 15288 and the life cycle information items standard ISO/IEC/IEE 15289 that are necessary to accomplish a particular function. The profiles are applicable to the vast majority of VSEs that don't develop critical systems or critical software. Systems, in the context of ISO/IEC 29110, are typically composed of hardware and software components. The most useful ISO/IEC 29110 documents for VSEs are the series of systems and software management, engineering and service delivery guides. The guides provide to VSEs a set of 'ready-to-use' processes, activities, tasks and roles as well as proposed content of input and output work products.

The ISO/IEC 29110 is intended to be used with any life cycle such as waterfall, iterative, incremental, evolutionary or agile.

ISO/IEC JTC 1/SC 7/WG 26

Software testing

Stuart Reid
Convenor

FLAGSHIP STANDARD

ISO/IEC/IEEE 29119 series

Software and systems engineering — Software testing

ABOUT FLAGSHIP STANDARD

The purpose of the ISO/IEC/IEEE 29119 series of software testing standards is to define an internationally agreed set of standards for software testing that can be used by any organization when performing any form of software testing.

The core standards are based around a set of test processes, defined in Part 2, which cover testing at the organizational, management and dynamic test levels. The test documentation, defined in Part 3, is produced by executing the test processes; thus, the test documentation describes the outputs of the test processes. The requirement to use techniques to design the test cases is specified by the test processes in Part 2, while the different test design techniques are defined separately in Part 4. The overall concepts and common terminology used by the other parts are defined in Part 1. Static testing, in the form of reviews, is defined in ISO/IEC 20246.

ISO/IEC JTC 1/SC 7/JWG 28

Joint ISO/IEC JTC 1/SC 7 - ISO/TC 159/SC 4 WG: Common industry formats for usability reports

Shin Fukuzumi
Convenor

Thomas Geis
Convenor

FLAGSHIP STANDARD

ISO/IEC 25060 Series

Common industry format for usability-related information (CIF)

ABOUT FLAGSHIP STANDARD

The starting point for the reader of this series of standards is ISO/IEC TR 25060, which provides an overview and summary of usability-related process outputs, relevant concepts, and consistent terminology.

Requirements for reporting usability-related outputs in the 25060 series are

- context of use for the system (users, goals and tasks, environment during use and given resources of the users)
- essential user needs
- user requirements for user-system interaction
- specification of user-system interaction and user interface
- usability evaluation reports, including field data reports

ISO/IEC TR 25060:2010 is under revision to incorporate developments in the detailed standards (CIFs), and in SC7 with regards to system lifecycle management, requirements engineering, agile frameworks and quality management where Human-Centred design (HCD) is success critical.
Assistance from experts from these disciplines is highly appreciated.

ISO/IEC JTC 1/SC 7/WG 42

Architecture

Peter Fagg
Convenor

FLAGSHIP STANDARD

ISO/IEC/IEEE 42010:2011

Systems and software engineering — Architecture description

ABOUT FLAGSHIP STANDARD

ISO/IEC/IEEE 42010 captures the best practices in creating, analyzing and using architectures embodied in what it calls an Architecture Description.

The Architecture Description standard provides core terms, definitions and relationships for the description of architectures, and specifies desired properties of an Architecture Description.

The standard is domain-neutral, equally applicable to software, systems and enterprises; the intent is that it be used as the primary reference for domain-specific Architecture Descriptions, and by adopting a common vocabulary, concepts and processes, allow software, system and enterprise architects to communicate in a common language.

An example of where this has happened is in JTC 1/AG 8 which is concerned with the subject of Meta-Reference Architectures, the building block for creating physical architectures across many domains of application. The remit pf AG 8 is to standardize architecture practices across JTC 1. ISO/IEC/IEEE 42010 has been adopted as the primary point of reference for the Meta-Reference Architecture standards its members are developing.

Overview of the SC 7 Standards Collection

Foundation

24765
Vocabulary

24774
Guidelines for Process Description

Documentation

15289
23026
26511
26512
26513
26514
26515
26531

BOK and Professionalization

19759
SWEBOK Guide

Certification

24773
SWE Prof. Certification

Life Cycle Processes

15288
24748-2
24748-4
Systems Engineering

24748-1
Life Cycle Management

24748-8
24748-7
Defense

29110 Series
Very Small Entities

12207
24748-3
24748-5
90003
Software Engineering

30103
Framework for Product Quality Achievement

16350
16351
Application Management and Guidance

Architecture, Assessment and Certification

15504
330xx
29169
30105-x
Process Assessments

19770
IT Asset Management

42010
42020
42030
Architecture

Product Characteristics

14598
14756
41062
Software Quality

25000 Series (20 Parts)
Software Quality SQuaRE

14143
19761
20926
20968
24570
29881
Software Functional Size Measurement

Life Cycle Activities

21839
21840
21841
System of Systems

29148
Requirements

29119-x
20246
Testing and Reviews

14764
Software Maintenance

16326
Project Management

15026
16085
Risk Mgt and Assurance

15939
29155
Measurement

Implementation and Assessment

5806 5807
8631 8790
8807 11411
12182
SC7 Legacy Standards

14102 14471 15940
18018 20741 23026
24766 2655x 2656x
30130
Tools, Methods,, and Environnements

10746 13235
14750 14752
14753 14769
14771 15414
19770-x
Spécifications

15437 15909
19501 19505
19793 24744
19507 31320
Modeling

14568 15474
15475 15476
15909 1950x
Interchange

Version 20.1 May 2020

More Information on SC 7 and its WGs

www.itamstandards.org

ISO YouTube Channel in French:
https://www.youtube.com/watch?v=w8wCIyDqYLI&t=2s

Czech site:
https://cs.wikipedia.org/wiki/ISO_29110

computer.org/sevocab