BS ISO/IEC 15940:2013

BSI Standards Publication

Systems and software engineering — Software Engineering Environment Services

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW

raising standards worldwide™

Full document details: BS ISO/IEC 15940:2013

National foreword

This British Standard is the UK implementation of ISO/IEC 15940:2013.

The UK participation in its preparation was entrusted to Technical Committee IST/15, Software and systems engineering.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2013. Published by BSI Standards Limited 2013

ISBN 978 0 580 78097 4

ICS 35.080

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 April 2013.

Amendments issued since publication

Date	Text affected

Documents
Document Sharing Hub

Full document details: BS ISO/IEC 15940:2013

INTERNATIONAL STANDARD

ISO/IEC 15940

Second edition
2013-03-15

Systems and software engineering — Software Engineering Environment Services

Ingénierie du logiciel et des systèmes — Services d'environnement en ingénierie du logiciel

Reference number
ISO/IEC 15940:2013(E)

Documents
Document Sharing Hub

© ISO/IEC 2013

Full document details: BS ISO/IEC 15940:2013

COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2013

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
Web www.iso.org

Published in Switzerland

© ISO/IEC 2013 – All rights reserved

Documents
Document Sharing Hub

Full document details: BS ISO/IEC 15940:2013

Contents

Page

Foreword vi

Introduction vii

1 Scope 1

2 Terms and definitions 1

3 Abbreviated terms 3

4 Reference Model for SEE services 3
4.1 Categories of SEE services 3
4.2 Structure of service description 3
4.3 Reference model 3

5 Software engineering services 5
5.1 Overview 5
5.2 Software requirements engineering service 6
5.3 Software reverse engineering service 6
5.4 Software re-engineering service 7
5.5 Software prototyping service 7
5.6 Software modelling service 7
5.7 Software simulation service 8
5.8 Software design service 8
5.9 Software component based software generation service 8
5.10 Software source code generation service 9
5.11 Software compilation service 9
5.12 Software debugging service 9
5.13 Software static/dynamic analysis service 10
5.14 Software testing service 10
5.15 Software verification service 11
5.16 Software integration service 11
5.17 Software domain engineering service (Software reuse) 11
5.18 Software reuse asset management service (Software reuse) 12
5.19 Software reuse program management service (Software reuse) 12

6 Systems engineering services 13
6.1 Overview 13
6.2 System solution orientation service 13
6.3 System Operational scenarios service 14
6.4 System modelling service 14
6.5 System architectural design service 15
6.6 System Requirements engineering service 15
6.7 System Re-engineering service 15
6.8 System Simulation service 16
6.9 System Integration service 16
6.10 System testing service 16
6.11 System test synthesis & report service 17
6.12 System work product verification service 17

7 System engineering techniques services 18
7.1 Overview 18
7.2 Value analysis service 18
7.3 Trade-off analysis 18
7.4 Effectiveness analysis 19
7.5 Technology maturity analysis 19

Documents
Document Sharing Hub

© ISO/IEC 2013 – All rights reserved

Full document details: BS ISO/IEC 15940:2013

8 Technical management services 20
8.1 Overview 20
8.2 Configuration management service 20
8.3 Change management service 20
8.4 SEE repository management service 21
8.5 Reuse management service 21
8.6 Measurement and analysis service 21
8.7 Quality assurance service 22
8.8 Audit service 22
8.9 Traceability service 22
8.10 Documentation service 23
8.11 Review service support 23

9 Project management services 24
9.1 Overview 24
9.2 Project strategy service 24
9.3 Project planning service 24
9.4 Project estimation service 25
9.5 Project risk management service 25
9.6 Project monitoring and scheduling service 25
9.7 Project evaluation service 26
9.8 Decision management service 26
9.9 Information management service 27

10 Process management services 27
10.1 Overview 27
10.2 Process definition service 28
10.3 Process library service 28
10.4 Process initiation service 28
10.5 Process usage service 29
10.6 Process monitoring service 29
10.7 Process improvement support service 29
10.8 Process documentation service 30

11 SEE support services 30
11.1 Overview 30
11.2 SEE common support service 30
11.3 SEE publishing service 31
11.4 SEE cooperative work support service 31
11.5 SEE user communication support service 31
11.6 SEE administration service 32
11.7 SEE policy enforcement service 32
11.8 SEE data/information mining service 32
11.9 SEE data retrieve/storage service 33
11.10 SEE data/information exchange service 33
11.11 SEE enabling support service 33

12 SEE infrastructure services 34
12.1 Overview 34
12.2 SEE infrastructure management service 34
12.3 SEE information sharing service 35
12.4 SEE repository service 35
12.5 SEE operating system service 35

Annex A (informative) **Exemplary automated support for the SEE services** 37

Annex B (informative) **Services mapped on to ISO/IEC 12207 activities** 46

Annex C (informative) **Services mapped on to ISO/IEC 15288 activities** 52

Annex D (informative) **Exemplary categories relationship for the SEE Services** 57

Annex E (informative) **Application of this International Standard** 58

AVA Documents
Document Sharing Hub

© ISO/IEC 2013 – All rights reserved

Full document details: BS ISO/IEC 15940:2013

Annex F (informative) **Traceability between ISO 15940:2006 and "ISO-15940 for Systems and Software engineering"** **59**

Bibliography **63**

© ISO/IEC 2013 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO/IEC 15940:2013

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.

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

The main task of the joint technical committee 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 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.

ISO/IEC 15940 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*.

This second edition cancels and replaces the first edition (ISO/IEC 15940:2006), which has been technically revised.

Documents
Document Sharing Hub

© ISO/IEC 2013 – All rights reserved

Full document details: BS ISO/IEC 15940:2013

Introduction

Software engineering environments, or “SEEs” refer to a collection of services, partially or fully automated by software tools, that are used to support the execution of human activities in systems and software engineering.

These activities are usually carried out within a software or system development/maintenance project, and cover such areas as the specification, development, re-engineering or maintenance of systems.

ISO/IEC 12207 describes in a comprehensive manner all of the processes, activities and tasks performed during the software life cycle.

The term “Software Engineering Environment” may cover several situations; from the mere juxtaposition of a few tools running on the same operating system, to the fully integrated environment, able to handle, monitor, and even control all the data, processes, and activities in the systems and software engineering life cycle. A SEE provides support to human activities through a series of services that describe the capabilities of the environment. The software process supported by a SEE becomes an assisted or automated software process. This International Standard describes SEE services and relates them to ISO/IEC 12207:2008 in a manner applicable to a range of organizations. In defining a life cycle process for an organization, the user needs to find the appropriate level of automation provided by a software engineering environment. This may result in establishing a new SEE or improving an existing one.

Through the automation of activities, either partially or fully, the SEE provides benefits to an organization through reduced cost (higher productivity), improved management and from the higher product quality that can result. For example, the automation of repetitive activities such as the execution of test cases provides not only productivity gains, but can also help to ensure completeness and consistency in the testing activities

This International Standard defines the SEE services conceptually in a reference model that can be adapted to any SEEs to automate one or more software and system engineering activities.

For a user interested in a specific process, this International Standard describes the relationship between given systems and software engineering processes, the software engineering services, and the corresponding exemplary software engineering tools.

The suite of SEE services described supports the process definitions in ISO/IEC 12207. The purpose is to define a set of SEE Services that are compatible with ISO/IEC 12207:2008, and that can be used either as a general reference, or to define an automated software and system process.

© ISO/IEC 2013 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO/IEC 15940:2013

Documents
Document Sharing Hub

INTERNATIONAL STANDARD ISO/IEC 15940:2013(E)

Systems and software engineering — Software Engineering Environment Services

1 Scope

This International Standard provides a description of SEE services that supports all of the software and system life cycle processes defined in ISO/IEC 12207.

The services are intended as a complete set and can be used in any systems and software engineering development or support organization where there is a need to select one or more SEE services. Such an organization may or may not have systems and software projects that use the ISO/IEC 12207 process framework.

A reference model for SEE Services is provided within this International Standard. This reference model has been produced starting from References [8] and [9]. This International Standard was produced using material originally published by the Software engineering Institute (Carnegie Mellon University, USA), NIST and ECMA, which finally resulted in a joint effort from ECMA and NIST indicating a broad consensus at the time of publication. In addition to this background process, structure from ISO/IEC 12207:2008 has been used as a baseline.

SEE Services for System Engineering and Software Reuse have been added to the revision of this International Standard. The list of changes between the previous version (ISO/IEC 15940:2006) and this version is given in Annex F.

2 Terms and definitions

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

2.1
life cycle model
framework containing the processes, activities and tasks involved in the development operation and maintenance of a software and system product, spanning the life of the system from the definition of its requirements to the termination of its use

[ISO/IEC 12207:2008]

2.2
CASE
computer-aided software engineering
use of computers to aid in the software engineering process

[ISO/IEC/IEEE 24765:2010]

2.3
CASE tool
software product that can assist software and system engineers by providing automated support for software and system engineering life-cycle activities as defined in ISO/IEC 12207:2008

[ISO/IEC 14102:2008]

© ISO/IEC 2013 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO/IEC 15940:2013

2.4
organization
group of people and facilities with an arrangement of responsibilities, authorities and relationships

[ISO 9000:2005]

2.5
work product
any artefact produced by a process

NOTE This may include files, documents, part of the product, services, processes, specifications, and invoices.

[ISO/IEC/IEEE 24765:2010]

2.6
systems engineering
interdisciplinary approach governing the total technical and managerial effort required to transform a set of customer needs, expectations, and constraints into a solution and to support that solution throughout its life

NOTE This may include the definition of technical performance measures; the integration of engineering specialties toward the establishment of an architecture; and the definition of supporting lifecycle processes that balance cost, performance and schedule objectives

[ISO/IEC/IEEE 24765:2010]

2.7
software engineering environment
SEE
provides automated system context services and software specific services for the engineering of software systems and related domains (e.g., project management, process management, etc.)

NOTE It includes the platform, system software, utilities, and CASE tools installed.

2.8
SEE Service
consists in one or more service operations to support life cycle activities for the SEE

NOTE A SEE Service supplier provides a SEE Service for a SEE Service acquirer.

2.9
automated or assisted systems or software process
systems or software process that is performed either fully or partially supported by CASE tools

2.10
actor
organization or CASE tool that supplies and/or acquires SEE Services

2.11
operation
action needed to perform an Activity

NOTE One or more operations are necessary to execute an Activity. An operation may consist of other operations.

2.12
SEE Service acquirer
actor that acquires a SEE Service

2.13
SEE Service supplier
actor that supplies a SEE Service

© ISO/IEC 2013 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS ISO/IEC 15940:2013

3 Abbreviated terms

CASE – Computer Aided Software Engineering

SEE – Software Engineering Environment.

4 Reference Model for SEE services

4.1 Categories of SEE services

This International Standard provides a reference model for SEE services. As a reference model, this International Standard uses a set of conceptual descriptions to describe each service used in a software engineering environment. The "conceptual description" indicates that the description is from a reference viewpoint, and does not deal with any specific implementation. The description is therefore general and does not assume any specific application domain, life cycle model, or tool in a project. In this way, this International Standard can be applied to any defined organizational environment.

An actual environment is one that is built from a reference model containing conceptual descriptions. Therefore, an actual description of a specific environment would reflect a particular activity with its tools and standards. The services described in this International Standard are grouped into eight categories that reflect broad functional activities within a typical systems and software engineering organization. The eight categories are:

- Software engineering services (e.g., Software Modelling);
- Systems engineering services (e.g., System Modelling);
- Systems engineering techniques services (e.g. Value analysis);
- Technical management services (e.g., Reuse, Configuration management);
- Project management services (e.g., Estimation, Project monitoring);
- Process management services (e.g., Process Monitoring, Process improvement);
- SEE Support services (e.g., Publishing, Policy enforcement);
- SEE infrastructure services (e.g., Repository, Communication, Operating System services).

4.2 Structure of service description

Each service is defined under two headings:

- Service Concept, to provide a description of the service in terms that are not related to a specific implementation;
- Service Operations, to list those operations that may be included in a service. These lists of operational capabilities represent, in most cases, primary services only and are not intended to be complete.

Exemplary automated supports for each SEE Services are listed in Annex A, it includes lists of corresponding service operations to help readers understand SEE.

4.3 Reference model

SEE services can be identified within a Reference model. This section presents those concepts that are part of this reference model (see Fig.1 SEE Reference Model described in UML). The reference model is made of the following concepts:

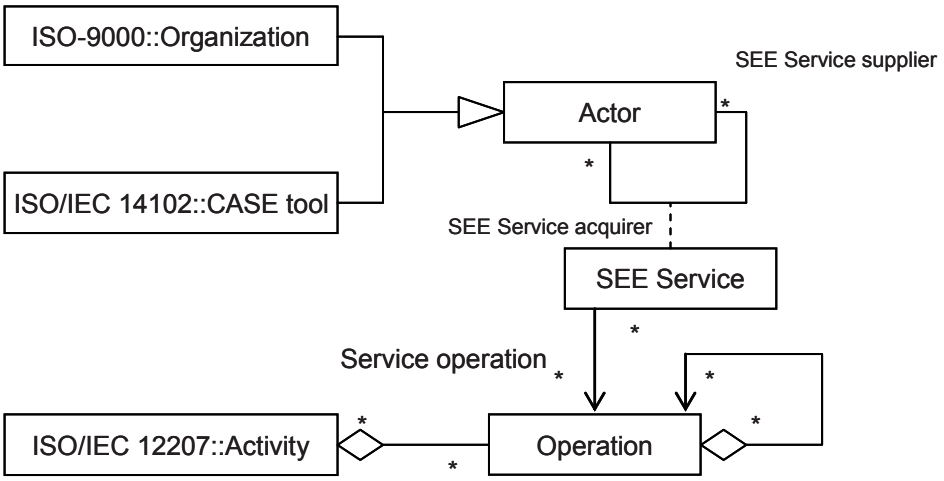
- Software and system engineering Environment (model itself);
- SEE Service;
- SEE Service Operation;

© ISO/IEC 2013 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO/IEC 15940:2013

- CASE Tool;
- Actor;
- Activity;
- Organization.

While engineering software and systems and in related domains (e.g. project management), a life cycle Activity is achieved by one or more Operations. SEE Service operations satisfy target life cycle activities. Actor provides and/or consumes SEE Service.



NOTE Actor itself can be acquirer and/or supplier of a SEE service that is provided by an association of Actors. SEE Service can not exist alone without Actor.

NOTE brief usages of UML notation are described here for readers benefit

© ISO/IEC 2013 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS ISO/IEC 15940:2013

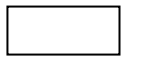
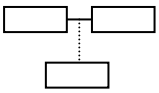
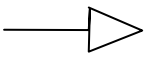
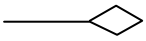
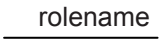
	class: A class is drawn as a solid-outline rectangle with a class name. A class name proceeding package names separated by double colons (::) indicate a class defined in another package
	association class: An association that also has class properties (or a class that has association properties) shown as a class symbol (rectangle) attached by a dashed line to an association path
	association: Binary associations are shown as lines connecting two class symbols
	inheritance: A subclass "inherits" from the superclass, ("is a" relationship)It is represented in the image with a line starting at the subclass and ending in a white arrow at the superclass
	aggregation: A superclass instance "uses a" subclass instance (or more than one)It is represented in the images with a line starting at the superclass with a white diamond and ending in the subclass
	rolename: A name string near the end of the line indicates the role played by the class attached, if specified
	navigability: An arrow may be attached to the end of the line to indicate that navigation is supported toward the classifier attached to the arrow. Normally one-way navigability is shown and two-way navigability is suppressed (no-way navigability is rare in practice)
	* multiplicity: specifies the number of target instances that may be associated with a single source instance across the given Association. A single star '*' denotes the unlimited nonnegative integer range multiplicity that means many

Figure 1 — SEE Reference Model described in UML

5 Software engineering services

5.1 Overview

The services in this section support activities related to software life cycle specific services. The following services are defined and grouped in this section:

* Software requirements engineering services;
* Software reverse engineering service;
* Software re-engineering service;
* Software prototyping service;
* Software design service;
* Software modelling service;
* Software simulation service;
* Software component based software generation service;

© ISO/IEC 2013 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO/IEC 15940:2013

* Software source code generation service;
* Software compilation service;
* Software debugging service;
* Software static/dynamic analysis service;
* Software testing services;
* Software verification service;
* Software integration services;
* Software domain engineering service (Software reuse);
* Software reuse asset management service (Software reuse);
* Software reuse program management service (Software reuse).

5.2 Software requirements engineering service

5.2.1 Service concept

This service provides the ability to capture, represent, analyse, validate, and refine those system requirements that fulfil operational needs and are allocated to software components.

5.2.2 Service operations

This service provides the ability to:

- Elicit and capture software and business requirements;
- Structure the software requirements;
- Create, modify, browse, and present software requirements;
- Group and prioritise software requirements;
- Check consistency of software requirements;
- Allocate software requirements for each software component;
- Conduct impact analysis for the addition, subtraction, or modification in a requirement against the project , value, resources, and timeline;
- Validate and baseline the document specs based on stakeholders and developers.

5.3 Software reverse engineering service

5.3.1 Service concept

This service provides the ability to capture design information from source or object code, and produce structure charts, call graphs, and other design documentation to provide new functionality or support a new environment.

5.3.2 Service operations

This service provides the ability to:

- Generate design from source code;
- Generate source program from object code;

© ISO/IEC 2013 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS ISO/IEC 15940:2013

- Generating design metrics (complexity metrics etc) (so that they can be considered for decision for reengineering or rewrite);
- Identifying unused code so that it can be removed if necessary.

5.4 Software re-engineering service

5.4.1 Service concept

This service provides the ability to take a new or a modified set of software requirements and the existing design as input and produce a new or modified design.

5.4.2 Service operations

This service provides the ability to:

- Revise or restructure existing design, components and/or code;
- Perform impact analysis of new design on existing software components;
- Translate from one notation or language into another;
- Check that the new set of requirements is consistent with the existing system;
- Determine the impact of the altered design on the existing set of components;
- Creating reusable modules from existing code;
- Creating wrappers for existing modules.

5.5 Software prototyping service

5.5.1 Service concept

This service provides the ability to enable the production of a software system that reproduces the user interface and emulates the functionality and behaviour of the final system to be built.

5.5.2 Service operations

This service provides the ability to:

- Build a prototype from requirements;
- Develop reusable or throw away prototype;
- Document the findings from prototype;
- Develop sample prototype of reports required;
- Invoke software modelling service if necessary and available;
- Produce a user interface from requirements;
- Execute a prototype : Also include capture user feedback on prototype;
- Conduct simulations if necessary and available.

5.6 Software modelling service

5.6.1 Service concept

This service provides the ability to model requirements and/or design in order to determine the effectiveness of alternative designs with respect to such attributes as user interface characteristics or execution flow.

Documents
Document Sharing Hub

© ISO/IEC 2013 – All rights reserved

Full document details: BS ISO/IEC 15940:2013

5.6.2 Service operations

This service provides the ability to:

- Build a software model (graphical, logical, mathematical, formal, etc.) from requirements;
- Validate a software model; it can be based on completeness and correctness with respect to the requirements;
- Map and/or transform one software model into another;
- Analyse a software model.

5.7 Software simulation service

5.7.1 Service concept

This service provides the ability to validate a software model by simulation in order to determine the effectiveness of alternative designs with respect to such attributes as user interface characteristics or execution flow.

5.7.2 Service operations

This service provides the ability to:

- Build a simulation model by invoking the software modelling service if necessary and available;
- Execute a software model;
- Capture simulation results of software models.

5.8 Software design service

5.8.1 Service concept

This service provides the ability to capture, represent, create, analyse, and refine the design attributes of the software components of a system or subsystem. The outcome of the software design service includes the definition of the software components and sub-components.

5.8.2 Service operations

This service provides the ability to:

- Translate requirements into architecture and design elements;
- Create and modify software architecture and design representation;
- Validate architecture and design artefacts to requirements;
- Produce structure charts, graphs, screens or other design information from a design representation;
- Structure design specifications;
- Architecture and design documentation;
- Evaluate architecture and design representations.

5.9 Software component based software generation service

5.9.1 Service concept

This service provides the ability to produce automatically and semi-automatically software components using existing components or component templates.

© ISO/IEC 2013 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS ISO/IEC 15940:2013

5.9.2 Service operations

This service provides the ability to:

- Generate a parser from a syntactic language description;
- Generate a script for the composition and interconnection of software components;
- Generate a rule-based system from a set of rules;
- Generate a user interface component for a software system.

5.10 Software source code generation service

5.10.1 Service concept

This service provides the ability to generate modules from design specifications.

5.10.2 Service operations

This service provides the ability to:

- Generate modules from design specifications;
- Invoke the software static/dynamic analysis service and work-through source code;
- Provide for traceability to design specifications.

5.11 Software compilation service

5.11.1 Service concept

This service provides the ability to support the translation (e.g., build, compile or interpretation) and linking of software components written in various programming languages. The principal outputs from this service are executable programs supporting the implementation of some target system.

5.11.2 Service operations

This service provides the ability to:

- Find code and inheritance dependencies among a set of software components;
- Pre-process source code to produce modified source code;
- Apply macro expansions to source code;
- Translate a source program into some target object code language;
- Produce report on the translation; this may include source listings of various complexity, including cross-reference data, compilation speeds, CPU usage, etc.;
- Link the object code into executable images. When intended for use on a remote target, link code into loadable/bootable images;
- Update the compiled system incrementally to reflect new changes.

5.12 Software debugging service

5.12.1 Service concept

This service provides the ability to locate and repair source code errors in individual software components by controlled or monitored execution of the code to track down errors and replace code.

© ISO/IEC 2013 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO/IEC 15940:2013

5.12.2 Service operations

This service provides the ability to:

- Instrument source programs by inserting breakpoints, instruction traps, printing out data values, and modifying source text;
- Execute programs incrementally;
- Monitor and save execution output;
- Log and measure debugging results;
- Analyse properties of programs and their current data values.

5.13 Software static/dynamic analysis service

5.13.1 Service concept

This service provides for the static analysis, or source code analysis, of software components in order to determine execution structure within the component and for the dynamic analysis, or code in execution analysis, in order to determine execution behaviour characteristics.

5.13.2 Service operations

This service provides the ability to:

- Collect raw statistics from a software module and/or component;
- Compute complexity measures from a software module and/or component;
- Produce and graphically represent cross reference lists;
- Collect raw statistics from a software module and/or component in execution;
- Produce and graphically represent characteristics of the execution behaviour;
- Produce findings according predefined template or rules.

5.14 Software testing service

5.14.1 Service concept

This service provides test software systems at the levels of individual software components (unit testing), on collections of software components (integration testing), and on complete software systems (system testing).

5.14.2 Service operations

This service provides the ability to:

- Develop test strategy : top down or bottom up integration testing, black box and white box testing;
- Estimate the testing required based on various defect models like error injection models etc and accordingly to testing plan;
- Develop test cases from requirements (e.g. from use cases);
- Determine test coverage of the code;
- Develop stubs for unit testing;
- Develop test data using test data generation tools for unit testing, integration testing and regression testing with consideration of boundary values, high volume or representative data;
- Keep track of defects found during the testing; Categorize defects based on priority, severity, module etc. Develop defect statistics reports for project management and status tracking;

© ISO/IEC 2013 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS ISO/IEC 15940:2013

- Generate test cases;
- Analyse source programs and generate reports;
- Enable traceability to requirements;
- Perform appropriate types of testing (e.g., functional, operational, security, performance etc.);
- Perform non-regression testing of required previous test cases on the object under test;
- Simulate the overall working environment and perform system load testing;
- Compare test results with expected results.

5.15 Software verification service

5.15.1 Service concept

This service provides the ability to confirm by examination and provision of evidence that the specified requirements have been fulfilled.

5.15.2 Service operations

This service provides the ability to:

- Analyse specifications for consistency;
- Review and inspect source component (either source programming language or design language);
- Identify errors (between specifications and verified object);
- Produce summary report.

5.16 Software integration service

5.16.1 Service concept

This service provides the ability to support the integration of software modules and/or components to make up the final integrated software system.

5.16.2 Service operations

This service provides the ability to:

- Prepare software modules and/or components to be integrated;
- Manage module and/or component repository and libraries;
- Integrate modules and/or components according to a predefined architecture and model;
- Monitor integration and produce a status report.

5.17 Software domain engineering service (Software reuse)

5.17.1 Service concept

This service provides the ability to develop and maintain domain models, domain architectures and domain assets.

5.17.2 Service operations

This service provides the ability to:

- Create and execute a domain engineering plan;

Documents
Document Sharing Hub

© ISO/IEC 2013 – All rights reserved

Full document details: BS ISO/IEC 15940:2013

- Select the form(s) of representation to be used for domain architecture and model;
- Define the boundaries of the domain and the relationships between domains;
- Identify the needs of stakeholders;
- Construct a vocabulary;
- Classify and document the domain models and architecture;
- Evaluate the domain models, domain vocabulary, and domain architecture;
- Conduct domain analysis and domain asset review;
- Develop and document an domain asset specification;
- Analyse the impact on the changes of domain asset.

5.18 Software reuse asset management service (Software reuse)

5.18.1 Service concept

This service provides the ability to manage the life of reusable assets from conception to retirement.

5.18.2 Service operations

This service provides the ability to:

- Create and review an asset management plan;
- Implement and maintain an asset storage and retrieval mechanism;
- Develop, document, and maintain a classification scheme;
- Conduct review of the asset storage and retrieval mechanism;
- Evaluate the asset based on the asset acceptance criteria;
- Classify asset in accordance with the reuse classification scheme;
- Perform configuration management for the asset;
- Track each reuse of the asset;
- Forward the change, modification, request, and problem reports on asset;
- Monitor and record asset status reports;
- Retire assets from the asset storage.

5.19 Software reuse program management service (Software reuse)

5.19.1 Service concept

This service provides the ability to plan, establish, manage, control and monitor an organization's reuse program.

5.19.2 Service operations

This service provides the ability to:

- Establish organization's reuse strategy including reuse goals, purposes, objectives, and scope;
- Name a reuse sponsor;
- Identify the reuse program participants and assign their roles;
- Identify and document the domains where reuse opportunities arise;

© ISO/IEC 2013 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS ISO/IEC 15940:2013

- Evaluate the domains to be reused;
- Conduct reviews in accordance with the software review process;
- Assess the organization's reuse capabilities;
- Assess each domain to determine the reuse potential;
- Create, document, maintain the reuse program implementation plan;
- Review and evaluate the reuse plan;
- Monitor the status of the reuse progress;
- Record and resolve the problems and non-conformances to the reuse plan;
- Assess reuse program periodically;
- Report the reuse steering function about assessment results and lessons learned.

6 Systems engineering services

6.1 Overview

The services in this section support activities related to the system life cycle specific services. The following services are defined and grouped in this section:

- System solution orientation service;
- System Operational scenarios service;
- System Requirements engineering service;
- System modelling service;
- System Architectural Design service;
- System Re-engineering service;
- System Simulation service;
- System Integration services;
- System Testing services;
- System Test synthesis & report service;
- System Work product verification service.

6.2 System solution orientation service

6.2.1 Service concept

This service provides the ability to identify the orientations is terms of technical solutions, indicating main elements for each technical solution (performance (critical requirements), costs estimation and schedule). Inputs are high-level business or operational concepts identified from operational domain & needs analysis and/or market analysis. Other inputs may come from research results.

6.2.2 Service operations

This service provides the ability to:

- Elicit and analyse high level operational environment and needs;
- Analyse technology trends (including standards), their maturity levels (Technology Readiness Levels - TRLs) and potential technology migration stakes and planning;

© ISO/IEC 2013 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO/IEC 15940:2013