
**Buildings and constructed assets —
Service life planning —**

Part 10:
When to assess functional performance

*Bâtiments et biens immobiliers construits — Prévion de la durée de
vie —*

iTeh STANDARD PREVIEW
Partie 10: Quand évaluer la performance fonctionnelle
(standards.iteh.ai)

ISO 15686-10:2010

<https://standards.iteh.ai/catalog/standards/sist/5910052f-0324-41ea-aaa6-22829789c62b/iso-15686-10-2010>



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 15686-10:2010

<https://standards.iteh.ai/catalog/standards/sist/5910052f-0324-41ea-aaa6-22829789c62b/iso-15686-10-2010>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2010

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing 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

Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Assessing functional performance in service life planning	6
4.1 Phases and stages in the whole life	6
4.2 When to compare levels of demand and supply during the whole life.....	6
4.3 Issues that arise at various stages of the whole life	15
4.4 Updates and audits of the levels of functionality and serviceability	15
5 Estimation of risk and cost consequences due to gaps	15
5.1 Terms and concepts.....	15
5.2 During pre-project stages.....	15
5.3 During pre-construction and construction stages	15
Annex A (informative) Concepts of functionality and serviceability	17
Annex B (informative) Derivation of stages in the service life from other International Standards	20
Annex C (informative) Typical actions and functions at each stage of the whole life.....	24
Annex D (informative) Consider change as well as degradation.....	34
Annex E (informative) Tools to prioritize projects and allocate resources	36
Bibliography.....	37

<https://standards.iteh.ai/catalog/standards/sist/5910052f-0324-41ea-aaa6-22829789c62b/iso-15686-10-2010>

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member 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 shall not be held responsible for identifying any or all such patent rights.

ISO 15686-10 was prepared by Technical Committee ISO/TC 59, *Building construction*, Subcommittee SC 14, *Design life*.

ISO 15686 consists of the following parts, under the general title *Buildings and constructed assets — Service life planning*:

- *Part 1: General principles and framework* [ISO 15686-10:2010](https://standards.iteh.ai/catalog/standards/sist/5910052f-0324-41ea-aaa6-22829789c62b/iso-15686-10-2010)
- *Part 2: Service life prediction procedures* <https://standards.iteh.ai/catalog/standards/sist/5910052f-0324-41ea-aaa6-22829789c62b/iso-15686-10-2010>
- *Part 3: Performance audits and reviews*
- *Part 5: Life-cycle costing*
- *Part 6: Procedures for considering environmental impacts*
- *Part 7: Performance evaluation for feedback of service life data from practice*
- *Part 8: Reference service life and service-life estimation*
- *Part 9: Guidance on assessment of service-life data* [Technical Specification]
- *Part 10: When to assess functional performance*

Data requirements is to form the subject of a part 4.

Buildings and constructed assets — Service life planning —

Part 10:

When to assess functional performance

1 Scope

This part of ISO 15686 establishes when to specify or verify functional performance requirements during the service life of buildings and building-related facilities, and when to check the capability of buildings and facilities to meet identified requirements.¹⁾

This part of ISO 15686 is applicable to any scope of holdings, whether a set (or portfolio) of buildings, a single building (large or small) or a facility which is part of a building (such as one group of spaces, one floor or several floors). It is applicable to the range of roles of stakeholders, from the owners and managers to the occupants, tenants or other users. It is intended to be used with ISO 15686-1, ISO 15686-2, ISO 15686-3, ISO 15686-5, ISO 15686-6, ISO 15686-7, ISO 15686-8 and ISO 15686-9.

NOTE 1 The principles and methods can be applied to a single-family residence, but this part of ISO 15686 calls for greater frequency and extent of assessing demand and supply than is typically appropriate.²⁾

NOTE 2 The application of this part of ISO 15686 can be required by the client or by any entity having authority, including regulatory authority.

NOTE 3 In Table 2, the column entitled "Outputs called for by other parts of ISO 15686" is provided to show how outputs from other parts of ISO 15686 occur at each phase, whether or not this part of ISO 15686 requires action or output.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6707-1:2004, *Building and civil engineering — Vocabulary — Part 1: General terms*

ISO 15686-1, *Buildings and constructed assets — Service life planning — Part 1: General principles and framework*

ISO 15686-2, *Buildings and constructed assets — Service life planning — Part 2: Service life prediction procedures*

ISO 15686-3:2002, *Buildings and constructed assets — Service life planning — Part 3: Performance audits and reviews*

1) International Standards for the determination of levels of functionality (demand) and levels of serviceability (supply) are the responsibility of ISO/TC 59 SC 3.

2) International Standards for the description of performance of single-family residences for the purposes of specifying performance requirements and performance levels are the responsibility of ISO/TC 59 SC 15. Standardization work related to the performance of single-family detached and semi-detached dwellings is reflected in ISO 15928 (all parts).

ISO 15686-10:2010(E)

ISO 15686-5:2008, *Buildings and constructed assets — Service life planning — Part 5: Life-cycle costing*

ISO 15686-6, *Buildings and constructed assets — Service life planning — Part 6: Procedures for considering environmental impacts*

ISO 15686-7, *Buildings and constructed assets — Service life planning — Part 7: Performance evaluation for feedback of service life data from practice*

ISO 15686-8:2008, *Buildings and constructed assets — Service-life planning — Part 8: Reference service life and service-life estimation*

ISO/TS 15686-9, *Buildings and constructed assets — Service-life planning — Part 9: Guidance on assessment of service-life data*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6707-1 and ISO 15686-1 and the following apply.

3.1 asset

whole building, structure or unit of construction works, or a system or component or part thereof

3.2 behaviour in service

how a whole building, structure or unit of construction works, or a system or component or part thereof actually functions in its intended place and use

3.3 client

ISO 15686-10:2010
<https://standards.iteh.ai/catalog/standards/sist/5910052f-0324-41ea-aaa6->
<construction> person or organization responsible for initiating and financing a project and approving the brief

NOTE 1 Adapted from ISO 6707-1:2004, definition 8.3.

NOTE 2 In some countries, the role and qualification of “construction client” is defined by law and regulation, according to the scope and complexity of a project (see Reference [17]).

3.4 degradation

process whereby an action on an item causes a deterioration of one or more properties

NOTE Properties affected may be, for example, physical, mechanical or electrical.

[ISO 15686-8:2008, definition 3.4]

3.5 demand

<of a facility> requirement for **functional performance** (3.11)

3.6 disposal

<status change> transfer of ownership of, or responsibility for, the object of consideration

3.7 disposal

<end of life> transformation of the state of a building or **facility** (3.8) that is no longer of use

NOTE Transformation can include, either individually or in some combination, the decommissioning, deconstruction, recycling and demolition of the object of consideration.

3.8

facility

physical setting used to serve a specific purpose

NOTE 1 A facility may be part of a building, a whole building or more than one building, and may include related constructions (such as roads and walkways), which, taken as a whole, serve a specific **function** (3.10).

NOTE 2 The term encompasses both the physical object(s) and its (their) use.

3.9

feature

element or attribute of a **facility** (3.8) that indicates an aspect of its **serviceability** (3.29)

3.10

function

purpose or activity of **users** (3.34) and other **stakeholders** (3.30) for which an **asset** (3.1) or a **facility** (3.8) is designed, used or required to be used

3.11

functional performance

(of a facility) **performance** (3.19) of a **facility** (3.8) to support required **function(s)** (3.10) under specified use conditions

3.12

functional performance requirement

type and **level of functionality** (3.15) that is required by **stakeholders** (3.30) of a **facility** (3.8), building or other constructed **asset** (3.1), or of an assembly, component or product thereof, or of a movable asset, for a specific **function** (3.10)

<https://standards.iteh.ai/catalog/standards/sist/5910052f-0324-41ea-aaa6-22829789c62b/iso-15686-10-2010>

3.13

functionality

suitability or usefulness for a specific purpose or activity

3.14

gap

difference between the **level of functionality** (3.15) (or other attribute) that is required and the **level of serviceability** (3.17) (capability) that is or will be provided

3.15

level of functionality

number indicating the relative **functionality** (3.13) required for a **user** (3.34) group or customer for one **topic** (3.33) on a predetermined demand **scale** (3.26) from the level of the least (functionality) to the level of the most (functionality)

NOTE The level of functionality may be the consequence of several distinct **functions** (3.10) required to act in combination.

EXAMPLE Scale of integers from 0 to 9.

3.16

level of performance

number indicating the relative **performance** (3.19) required or provided for one **topic** (3.33) on a predetermined **scale** (3.25) from the level of the least (performance) to the level of the most (performance)

NOTE The level of performance may be the consequence of several distinct performances [**behaviours in service** (3.2)], of which one may be **functional performance** (3.11), which act in combination.

EXAMPLE Scale of integers from 0 to 9.

**3.17
level of serviceability**

number indicating the relative **serviceability** (3.29) [capability of a **facility** (3.8)] for a **user** (3.34) group or customer for one **topic** (3.33) on a predetermined supply **scale** (3.27) from the level of the least (serviceability) to the most (serviceability)

NOTE The level of serviceability may be the consequence of several distinct physical **features** (3.9) acting in combination.

EXAMPLE Scale of integers from 0 to 9.

**3.18
obsolescence**

(of a facility) inability of a **facility** (3.8) or component thereof to perform satisfactorily due to changes in **performance requirements** (3.20)

**3.19
performance**

(of a facility) **behaviour in service** (3.2) of a **facility** (3.8) for a specified use

NOTE The scope of this performance is of the facility as a system, including its subsystems, components and materials, and their interactions, such as acoustical, hygrothermal, economic and so on, as well as the **relative importance** (3.24) of each **performance requirement** (3.20).

iTeh STANDARD PREVIEW
(standards.iteh.ai)

**3.20
performance requirement**

performance (3.19) demanded or expected of a **facility** (3.8) for a specified use

NOTE Adapted from ISO 6707-1:2004, definition 9.1.16. <https://standards.iteh.ai/catalog/standards/sist/5910052f-0324-41ea-aaa6-22829789c62b/iso-15686-10-2010>

**3.21
profile**

(of a facility) list of the **levels of functionality** (3.15) required by **stakeholders** (3.30) for a **facility** (3.8), or the **levels of serviceability** (3.17) provided by a facility, related to various **topics** (3.33)

**3.22
rater**

individual who conducts the **rating** (3.23) of a **facility** (3.8) or of the design of a facility, to determine its **profile** (3.21) of **serviceability** (3.29)

**3.23
rating**

process of determining the **serviceability** (3.29) of a constructed **asset** (3.1) or of an asset that has been designed, but not yet built

**3.24
relative importance**

importance of any one **topic** (3.33) of **functionality** (3.13) for the operations or mission of the **users** (3.34)

**3.25
scale**

single set of statements in which intervals between statements, from the most to the least, are calibrated according to scalar rules

NOTE When people are asked to select one of the statements in a **scale** (3.26) (3.27) as most closely describing the **level of functionality** (3.15) required or as best describing the physical **features** (3.9) present in a **facility** (3.8), the scale, in effect, functions as a multiple choice questionnaire.

3.26**scale**

⟨demand⟩ **scale** (3.25) for use in determining the **level of functionality** (3.15) of a **facility** (3.8) on one **topic** (3.33) of **functional performance** (3.11)

3.27**scale**

⟨supply⟩ **scale** (3.25) for use in determining the **level of serviceability** (3.17) of a **facility** (3.8) on one **topic** (3.33) of capability

3.28**service life**

period of time after installation during which a **facility** (3.8) or its component parts meet(s) or exceed(s) the **performance requirements** (3.20)

NOTE Adapted from ISO 6707-1:2004, definition 9.3.84.

3.29**serviceability**

capability of a **facility** (3.8), building or other constructed **asset** (3.1), or of an assembly, component or product thereof, or of a movable asset, to support the **function(s)** (3.10) for which it is designed, used, or required to be used

NOTE Adapted from ISO 6707-1:2004, definitions 9.1.11 (capability) and 9.3.85 (serviceability).

3.30**stakeholder**

person or entity with an interest in or concern about a **facility** (3.8)

NOTE The interest may include a financial interest and may be continuing or temporary, as that of a visitor.

3.31**suitability**

⟨of a facility⟩ appropriateness to support the **functions** (3.10) or activities of **users** (3.34) or **stakeholders** (3.30)

3.32**threshold level**

number indicating the **level of functionality** (3.15) which, if not provided, would significantly or completely impair the ability of **users** (3.34) to carry out their intended activities or operations

3.33**topic**

single aspect of a **facility** (3.8) for which a **level of performance** (3.16) is determined

NOTE Levels of performance that may be determined include **levels of functionality** (3.15), **levels of serviceability** (3.17), **threshold levels** (3.32) and **relative importance** (3.24).

3.34**user**

organization, person, animal or object which uses, or is intended to use, a building or other construction works

NOTE 1 This includes any person or entity who uses a **facility** (3.8), whether as occupant, visitor, member of the public or other **stakeholder** (3.30) with interest in the facility.

NOTE 2 Adapted from ISO 6707-1:2004, definition 8.1.

**3.35
whole life**

period of time over which the **functionality** (3.13) [**functional performance** (3.11)] of a **facility** (3.8) is assessed in service life planning

NOTE 1 The whole life commences with the process of definition of need, before a project is explicitly launched, continues through the process of acquisition and use and operation of the facility, and concludes with **disposal** [(3.6), (3.7)], which involves either a status change or end-of-life action(s).

NOTE 2 The concepts of life cycle and whole life are interrelated, but differ, with the difference primarily based on the object of consideration and context. Within ISO/TC 59, three similar definitions of life cycle are applied; these definitions are given in ISO 14040 (ISO 14040:2006, definition 3.1), ISO 15392 (ISO 15392:2008, definition 3.15) and ISO 15686-5 (ISO 15686-5:2008, definition 3.3.4).

4 Assessing functional performance in service life planning

4.1 Phases and stages in the whole life

The phases and stages of whole life are given in Figure 1 and Tables 1 and 2.

NOTE There is no single International Standard for the phases and stages of the service life or whole life of a building or building-related facility. Table 1 gives a summary of the stages. The stages in Figure 1 and Tables 1 and 2 have therefore been derived from among the many different stages of service life identified in various International Standards of ISO/TC 59 and its subcommittees. The sources and derivation are provided in Annex B.

4.2 When to compare levels of demand and supply during the whole life

Significant gaps between required levels of functionality (demand) and actual or designed levels of serviceability (supply) shall be identified.

Appropriate levels of action shall be determined for the significant gaps identified for large or complex buildings or building-related facilities.

This shall be done at various stages during the whole life, as shown in Table 2. Table 2 states the actions required for assessing functional performance.

If Table 2 requires any action related to gaps between levels of demand and levels of supply, the significance of the gap shall be determined and appropriate action considered.

NOTE 1 The concepts and terms of functionality and of serviceability are summarized in Annex A.

NOTE 2 For the actions and functions to consider at each stage, see Annex C.

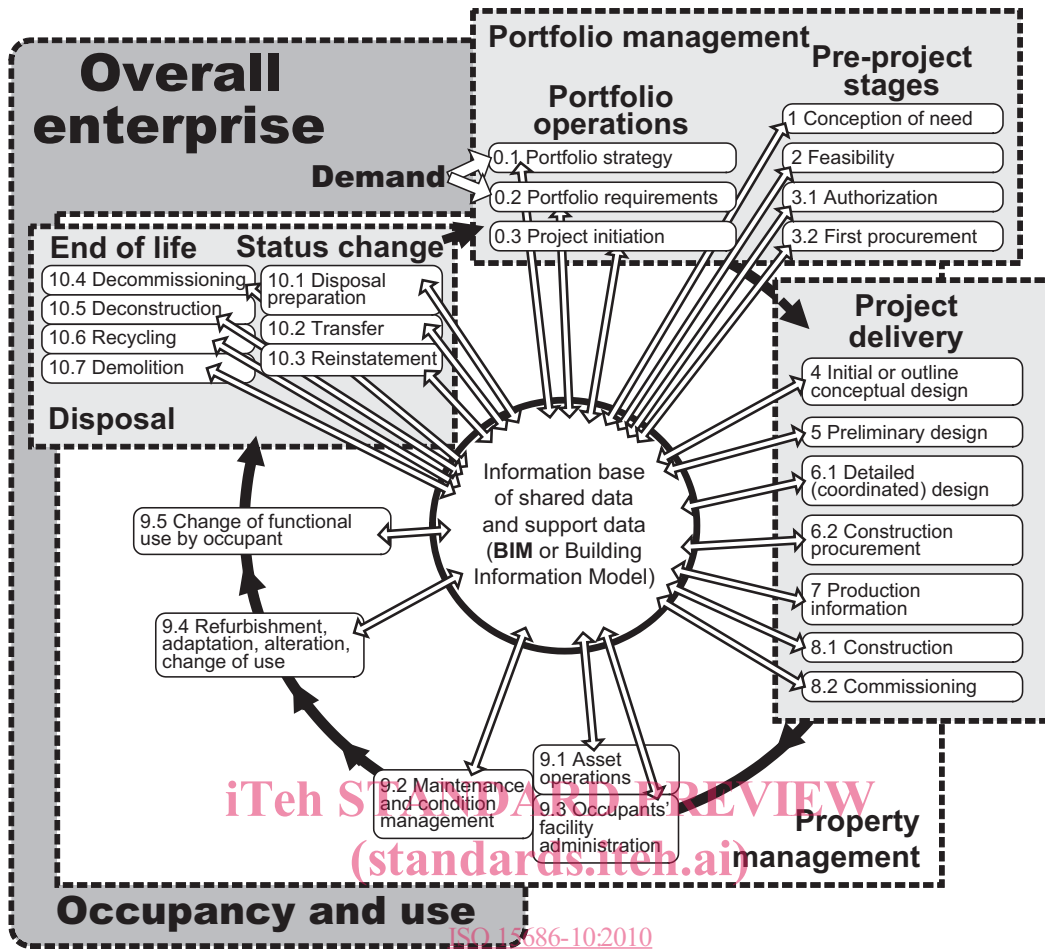
NOTE 3 The determination of the required levels of functionality and actual levels of serviceability are described in several references in the Bibliography, some of which have been standardized in one or more countries.

NOTE 4 If a building information model (BIM) is initiated and maintained, and the platform and rules for data format and exchange in the BIM conform to ISO/PAS 16739:2005 Release IFC2x3, it can include a property set giving guidance on how to store information about the functionality and serviceability profiles, and gaps, in the BIM. For the name and internet location of that property set, see Reference [16].

NOTE 5 The concepts of functionality and serviceability incorporate several closely related terms. For example, in Clause 3, terms designating the defined concepts include: function, functionality, functional performance, level of functionality, level of serviceability, suitability and serviceability. Annex A gives information about these concepts. Table A.1 gives a matched list of those and related terms.

Table 1 — Phases and stages of the whole life of a building or building-related facility

Phase		Stage no.	Name
Portfolio management	Portfolio operations	0.1	Portfolio strategy
		0.2	Portfolio requirements
		0.3	Project initiation
	Pre-project stages	1	Conception of need
		2	Feasibility
		3.1	Authorization
		3.2	First procurement
Project delivery	4	Initial or outline conceptual design	
	5	Preliminary design	
	6.1	Detailed (coordinated) design	
	6.2	Construction procurement	
	7	Production information	
	8.1	Construction	
	8.2	Commissioning	
Property management	9.1	Asset operations	
	9.2	Maintenance and condition management	
	9.3	Occupants' facility administration	
	9.4	Refurbishment, adaptation, alteration, change of use	
	9.5	Change of functional use by occupant	
Disposal	Status change	10.1	Disposal preparation
		10.2	Transfer
		10.3	Reinstatement
	End of life	10.4	Decommissioning
		10.5	Deconstruction
		10.6	Recycling
		10.7	Demolition



ISO 15686-10:2010
<https://standards.itech.ai/catalog/standards/sist/5910052f-0324-41ea-aaa6-22829789c62b/iso-15686-10-2010>

Figure 1 — Schematic diagram of phases and stages in the whole life

Table 2 — Actions required by ISO 15686 (all parts) at each stage of the whole life

Phase	Stage no.	Name	Main task(s) of stage	Actions required by this part of ISO 15686	Outputs called for by other parts of ISO 15686
Portfolio management	Portfolio operations	0.1	Portfolio strategy	— Develop and maintain portfolio strategy, plans and capital project priorities	When developing strategy, plans and project priorities for a portfolio of built assets, any significant gaps between demand profiles and serviceability profiles of the assets shall be considered.
		0.2	Portfolio requirements	— Create and maintain strategic brief for the portfolio	Strategic brief for the portfolio shall contain the organization's demand profile(s) (generic or typical or organizational). 15686-6: determine environmental goals for the portfolio

Table 2 — Actions required by ISO 15686 (all parts) at each stage of the whole life (continued)

Phase	Stage no.	Name	Main task(s) of stage	Actions required by this part of ISO 15686	Outputs called for by other parts of ISO 15686
Portfolio management	Portfolio operations	0.3 Project initiation	<ul style="list-style-type: none"> — Strategic brief for this specific project, including business and other requirements, and client's functional brief — Initiate and authorize start of project to satisfy requirements 	Client's functional brief shall contain any variants of its functional requirement levels from the applicable demand profile(s) (generic or typical or organizational).	15686-3: core audit to determine that service life has been adequately considered 15686-6: determine environmental goals for the project
	Pre-project stages	1 Conception of need	<ul style="list-style-type: none"> — Identify potential solution options to the need — Identify feasibility factors — Amplify the briefing document, which now includes client's general requirements 	Client's requirement shall include a main demand profile and any variants.	15686-5: strategic options analyses for whole-life costing/life-cycle costing 15686-6: document environmental goals and requirements, assumptions, constraints, etc.
		2 Feasibility	<ul style="list-style-type: none"> — Examine the feasibility of solution options presented in Stage 1 — Conduct substantive feasibility^a study of recommended option(s), including of procurement process — Define the project in a project brief 	Requirement levels shall be confirmed or fine-tuned, and consideration shall be given to whether or not to add or remove functional topics.	15686-3: core audit of brief to determine that the basis for service-life planning during design is adequate 15686-5: analyses for whole-life costing/life-cycle costing
Portfolio management	Pre-project stages	3.1 Authorization	<ul style="list-style-type: none"> — Select procurement process(es) for recommended option(s)^b — Assemble budget and other documents for approval — Gain financial approval 		15686-3: performance audits and reviews
		3.2 First procurement	<ul style="list-style-type: none"> — Conduct initial procurement according to the approved process 	The demand profile (and variants, if any) shall be included among criteria for what is to be delivered.	15686-3: performance audits and reviews