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Information technology — Open Systems Interconnection — Conformance testing methodology and framework —

Part 7: Implementation Conformance Statements

Technologies de l'information — Interconnexion de systèmes ouverts (OSI) — Essais de conformité — Méthodologie générale et procédures —

Partie 7: Déclarations de conformité des mises en œuvre

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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 field 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. 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.

International Standard ISO/IEC 9646-7 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee 21, *Open Systems Interconnection, data management and open distributed processing*.

ISO/IEC 9646 consists of the following parts, under the general title *Information technology - Open Systems Interconnection - Conformance testing methodology and framework*:

- *Part 1: General concepts*
- *Part 2: Abstract Test Suite specification*
- *Part 3: Tree and Tabular Combined Notation*
- *Part 4: Test realization*
- *Part 5: Requirements on test laboratories and clients for the conformance assessment process*
- *Part 6: Protocol profile test specification*
- *Part 7: Implementation Conformance Statements*

Annexes A to I of this part of ISO/IEC 9646 are for information only.

Introduction

ISO/IEC 9646-1 defines terminology and introduces general concepts for both protocol and profile testing. ISO/IEC 9646-2 specifies the requirements on the production of OSI conformance testing standards and standardized abstract test suites. ISO/IEC 9646-3 defines a standardized test notation, the Tree and Tabular Combined Notation (TTCN) for the specification of a standardized Abstract Test Suite. ISO/IEC 9646-4 places requirements on test realization and ISO/IEC 9646-5 places requirements on the conformance assessment process. ISO/IEC 9646-6 specifies requirements for the production of OSI protocol Profile Test Specifications.

This part of ISO/IEC 9646 specifies requirements for the development of Implementation Conformance Statements (ICS) for protocols, profiles and information objects (such as managed objects).

An ICS contains the necessary information required for conformance testing to the relevant requirements specified in OSI specifications and their related profiles.

The ICS proforma is in the form of a questionnaire or check-list that is intended to cover all requirements, all optional and conditional functions, elements of procedure, parameters, PDUs, timers, etc. and other capabilities identified in the specification. The ICS proforma is to be completed by the supplier or the implementor.

An overview of the System Conformance Statements (SCSs), ICSs and their proformas is given in clause 6.

Clause 7 describes the structure of SCS proformas.

Clause 8 describes the requirements and layout of ICS proforma specifications and profile Requirements Lists (RLs).

Clause 9 provides a complete specification for ICS proformas, as well as profile RLs, and describes requirements on the notation.

Annex A provides guidance on the meaning of ICS status values and support answers.

Annex B provides examples of profile RLs and profile specific ICSs.

Annex C provides examples of PICS proforma tables and profile RL tables.

Annex D provides guidance for interpreting additional status notations.

Annex E provides guidance on IXIT proformas.

Annex F provides information on information objects.

Annex G provides guidance on multi-specification dependencies.

Annex H provides guidance on status values for parameters on received Protocol Data Units.

Annex I provides guidance on ICS templates.

This part of ISO/IEC 9646 is also to be published by ITU as ITU-T Recommendation X.296, but not as identical text.

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Information technology – Open Systems Interconnection – Conformance testing methodology and framework - Part 7: Implementation Conformance Statements

1 Scope

This part of ISO/IEC 9646 gives guidance on the concepts of Implementation Conformance Statements (ICSs) and System Conformance Statements (SCSs) related to OSI specifications and specifies requirements and gives guidance on the production of ICSs, ICS proformas, ICS templates and profile Requirements Lists (RLs).

This part of ISO/IEC 9646 specifies for these documents, the structure, the questions to be asked, the syntax and notation to be used and the semantics of the questions and expected answers.

No generic ICS template is provided because of the wide variety of OSI specifications for which conformance requirements are stated. Nevertheless, this part of ISO/IEC 9646 specifies general requirements that are applicable to any OSI specification.

Other than guidance on the relation between an ICS and Implementation eXtra Information for Testing (IXIT), requirements and guidance on IXIT are outside the scope of this part of ISO/IEC 9646.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 9646. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO/IEC 9646 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO/IEC 7498-1: 1994, *Information technology – Open Systems Interconnection – Basic Reference Model: The Basic Model.*
(See also ITU-T Recommendation X.200 (1994)).

ISO/IEC 9646-1: 1994, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework - Part 1: General concepts.*
(See also ITU-T Recommendation X.290 (1995)).

ISO/IEC 9646-2: 1994, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework - Part 2: Abstract Test Suite specification.*
(See also ITU-T Recommendation X.291 (1995)).

ISO/IEC 9646-5: 1994, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework - Part 5: Requirements on test laboratories and clients for the conformance assessment process.*
(See also ITU-T Recommendation X.294 (1995)).

ISO/IEC 9646-6: 1994, *Information technology – Open Systems Interconnection – Conformance testing methodology and framework - Part 6: Protocol profile test specification.*
(See also ITU-T Recommendation X.295 (1995)).

ISO/IEC 10165-6: 1994, *Information technology – Open Systems Interconnection – Structure of management information: requirements and guidelines for implementation conformance statement proformas associated with OSI management.*
(See also ITU-T Recommendation X.724 (1993)).

ISO/IEC TR 10000-1: 1990, *Information technology – Framework and taxonomy of International Standardized Profiles – Part 1: Framework.*

3 Definitions

For the purposes of this part of ISO/IEC 9646, all definitions given in ISO/IEC 9646-1 and the following definitions apply.

3.1 ICS proforma specification: The specification which provides a complete ICS proforma.

3.2 ICS template: A template which is to be used as the basis for developing an ICS proforma.

4 Abbreviations

4.1 ISO/IEC 9646 abbreviations

For the purposes of this part of ISO/IEC 9646, the following abbreviations defined in ISO/IEC 9646-1 apply:

ATS: abstract test suite

ICS: implementation conformance statement

ISP: international standardized profile

IUT: implementation under test

IXIT: implementation extra information for testing

MOT: means of testing

OSI: open systems interconnection

PCTR: protocol conformance test report

PDU: protocol data unit

PICS: protocol implementation conformance statement

PSTS: profile specific test specification

PTS: profile test specification

RL: requirements list

SCS: system conformance statement

SCTR: system conformance test report

SUT: system under test

TTCN: tree and tabular combined notation

XRL: IXIT requirements list

NOTE – The following abbreviations were defined in ISO/IEC TR10000-1 but are superseded in ISO/IEC 9646 by more general terms:

IPRL: ISP requirements list (general term is profile RL)

ISPICS: ISP Implementation conformance statement (general term is profile ICS)

ISPIXIT: ISP Implementation extra information for testing (general term is profile IXIT)

4.2 ISO/IEC 10165-6 abbreviations

For the purposes of this part of ISO/IEC 9646, the following abbreviations defined in ISO/IEC 10165-6 apply:

MCS: management conformance summary

MIDS: management information definition statement

MOCS: managed object conformance statement

MRCS: management relationship conformance summary

5 Compliance

5.1 An OSI specification to which an implementation may be claimed to conform (i.e. specifying a protocol, information object or one or more profiles) shall

a) incorporate or reference the specification of an Implementation Conformance Statement (ICS) proforma;

b) include, within its conformance clause, text which is effectively equivalent to the following:

– "The supplier of an implementation which is claimed to conform to this <Specification> shall provide an ICS by completing an <ICS> proforma which conforms to the <ICS> proforma specification in <reference>, and shall provide the information necessary to identify both the supplier and the implementation."

5.2 An OSI specification that specifies an ICS proforma in compliance with this part of ISO/IEC 9646 shall satisfy the requirements stated in 8.1 to 8.4, 9.1 to 9.5 and clause 10.

An OSI specification that specifies a Protocol ICS (PICS) proforma in compliance with this part of ISO/IEC 9646 shall also satisfy the requirements stated in 8.5. An OSI specification that specifies an information object ICS proforma in compliance with this part of ISO/IEC 9646 shall also satisfy the requirements stated in 8.6. An OSI specification that specifies a profile ICS proforma in compliance with this part of ISO/IEC 9646 shall also satisfy the requirements stated in 6.5.4. An OSI specification that specifies a profile specific ICS proforma in compliance with this part of ISO/IEC 9646 shall also satisfy the requirements stated in 8.7.2 and 8.7.4.

5.3 An OSI specification that specifies a profile Requirements List (RL) in compliance with this part of ISO/IEC 9646 shall satisfy the requirements stated in 8.7.3 and clause 9 (with the exception of 9.3).

5.4 An OSI specification that specifies an ICS template in compliance with this part of ISO/IEC 9646 shall specify requirements applicable to some ICS proformas, such that any ICS proforma which complies with the ICS template also complies with this part of ISO/IEC 9646.

NOTE - In addition, the following conformance and compliance relationships are relevant to ICSs, ICS proformas and ICS templates:

a) the actual ICS proforma used by a supplier should conform to the relevant ICS proforma specification;

b) an ICS should conform to the relevant ICS proforma specification;

c) an ICS proforma should comply with the specification of an applicable ICS template, if any;

d) an ICS template may comply with the specification of a more general ICS template, if any.

5.5 An SCS proforma which is claimed to comply with this part of ISO/IEC 9646 shall satisfy the requirements of the SCS template and other applicable requirements specified in 6.6 and clause 7.

6 Overview

6.1 Introduction to System Conformance Statements (SCSs)

A conforming system or implementation is one which satisfies an identified and consistent set of static and dynamic conformance requirements specified in a set of related OSI protocol, profile, abstract syntax, encoding rule and information object specifications. Claims of conformance for a system are made in an SCS and associated ICSs which explicitly state conformance to static conformance requirements and thereby imply conformance to the associated dynamic conformance requirements.

An SCS, as defined in ISO/IEC 9646-1, is required to identify the OSI protocols, abstract syntaxes, encoding rules, and information objects to which conformance is claimed. An SCS is also required to identify the profiles to which conformance is claimed and to identify any other supported combinations of the protocols, abstract syntaxes, encoding rules and information objects, and the supported relationships between them.

A Management Conformance Summary (MCS), as defined in ISO/IEC 10165-6, is a special type of SCS, focusing on management aspects of the system. If there is an MCS for a system, the SCS shall reference the MCS.

An SCS contains the following information as a minimum

a) information related to both the real open system and the client:

1) administrative information to identify the client;

2) system information to identify the appropriate OSI specific part of the system, for example, product name and version number;

b) information related to those specifications for which an ICS is provided:

1) the identification of the specifications to which conformance is claimed, including version numbers, and in the case of a profile, the profile identification;

2) a reference to the related ICSs;

3) the identification of combinations of specifications that are supported, if those combinations are not covered by a profile

4) information on whether the support of specific profiles or other combinations of specifications involves static reconfiguration, dynamic reconfiguration, or no reconfiguration of the system.

The SCS may contain an indication of whether a System Conformance Test Report (SCTR) and its referenced Protocol Conformance Test Reports (PCTRs), received from a previous conformance assessment, are available for information.

When an SCS is submitted to a test laboratory for a conformance assessment process, the SCS should indicate which profiles or combinations of specifications are to be tested. It may also indicate if the System Under Test (SUT) is a complete or partial (N)-open system, if it is to be tested as an end-system or a relay system, and what protocols are within the SUT but not part of the IUT. For instance, if the IUT is an implementation of an application profile over layers 5 to 7, the SCS may indicate which protocols or profiles are used to provide the Transport service.

6.2 Introduction to Implementation Conformance Statements (ICSs)

For each of the specifications referenced in the SCS, the detailed statement of supported capabilities (i.e. of the static conformance requirements satisfied by the system) is provided in an ICS.

For each protocol specification for which conformance is claimed, the detailed statement of supported capabilities is called a Protocol Implementation Conformance Statement (PICS).

For each information object specification for which conformance is claimed, the detailed statement of supported capabilities is called an information object Implementation Conformance Statement (information object ICS). Specific examples of information object ICSs are Managed Object Conformance Statement (MOCS), Management Information Definition Statement (MIDS) and Management Relationship Conformance Summary (MRCS), for details, see ISO/IEC 10165-6.

For each profile or set of profiles for which conformance is claimed, the set of detailed statements of supported capabilities for that profile is called a profile Implementation Conformance Statement (profile ICS). A profile ICS includes all the relevant PICSs and information object ICSs. It may also include a profile specific statement of supported capabilities, which are not covered by any of the PICSs or information object ICSs; this is called a profile specific ICS.

NOTE – To avoid potential confusion, it is not recommended to create new abbreviations of the form xxxICS or xxxCS.

6.3 ICS proformas

6.3.1 General

To ensure consistency of an ICS with the static conformance requirements of the relevant OSI specification, all OSI specifications stating static conformance requirements are required to have an associated ICS proforma.

An ICS proforma is in the form of a questionnaire to be completed by the supplier or implementor of an implementation of the relevant OSI specification, to become an ICS.

An ICS proforma is essentially a set of items. An item is provided for each optional capability and for each major mandatory capability. Each item includes an item number, an item description, a status value specifying the support requirement, and room for a support answer to be provided by the implementor.

A minimal ICS proforma item is shown in figure 1. This example shows that item number 1 is Capability-A which, because the status value is "o", is optional. This means that the question to be answered by the implementor is "does your implementation support Capability-A (in the context applying to this table)?".

Item Number	Item Description	Status Value	Support Answer
1	Capability-A	o	

Figure 1 – A minimal ICS proforma item

The ICS proforma is a normative document to express in compact form the static conformance requirements of a specification. As such, it serves as a reference to the static conformance review. For particular cases requiring specific information, the ICS proforma can refer to the appropriate clause of the related specification by means of notes and comments.

6.3.2 PICS proformas

Each OSI protocol defining group is responsible for specifying the conformance requirements associated with the protocol. They are also responsible for ensuring that a PICS proforma is produced consistent with these conformance requirements, in a separate PICS proforma specification or in a normative annex of the protocol specification.

A PICS proforma captures the mandatory capabilities and implementation flexibility allowed by the protocol specification. It details which options are left to the implementor, and which are conditionally dependent on other options taken by the implementor. It also emphasizes global implementation options that can be taken in a system supporting the protocol, in terms of roles of the implementation (e.g. initiator, responder or relay) or providing for service capabilities (e.g. OSI Transport expedited data). It does not repeat the dynamic conformance requirements of the protocol specification.

6.3.3 Information object ICS proformas

For each information object specification to which conformance may be claimed, there should be an information object ICS proforma defined together with the information object definition. For example, managed object specifications should each have an associated MOCS proforma in compliance with ISO/IEC 10165-6.

The relationship between the support of an information object and the support of particular protocols or profiles should be specified in the relevant System Conformance Statement. Thus, there is no need for information object ICS proformas to include questions about the related protocols or profiles.

6.3.4 Profile specific ICS proformas

A profile may specify requirements on an implementation that cannot be mapped onto existing items in the base specification ICS proforma(s) relevant to the profile. In this case, a profile specific ICS proforma is required.

6.4 Profile Requirements Lists

A profile Requirements List is provided for each profile and captures

a) the general options of the profile as a whole;

b) a list of the specifications selected and combined in the profile, and references to the related ICS proformas;

c) for each of these referenced base specifications, a section of the profile RL expressing the restrictions upon allowed support answers in the corresponding PICS proforma and information object ICS proforma. This section of the profile RL is derived from the ICS proformas of the relevant base specifications, indicating the changes of status values necessary to express the profile requirements.

A minimal profile RL item is shown in figure 2. This example shows that the profile has changed the status of Capability-A, which is item number "1" in the PICS proforma, from "o" (i.e. optional) to "m" (i.e. mandatory). This means that conformance to the profile requires a support answer of "Yes" for this item in the PICS.

Item Number	Item Description	Protocol Status Value	Profile Status Value
1	Capability-A	o	m

Figure 2 – A minimal profile RL item

Notice that a profile RL is not an ICS proforma; it does not contain any questions, but rather restricts the acceptable answers to questions in the ICS proformas relevant to the profile. Thus, to use a profile RL, each table in it needs to be put alongside the corresponding table from the relevant ICS proforma. This is illustrated in figure 3.

PICS proforma table

Item Number	Item Description	Status Value	Support Answer
1	Capability-A	o	

Profile RL table

Protocol Status Value	Profile Status Value
o	m

Figure 3 – A profile RL item alongside the corresponding PICS proforma item

6.5 Relationships between OSI specifications and their related ICS proformas and ICSs

6.5.1 The general picture

Figure 4 shows the general picture of relationships between OSI specifications (protocol, information object and profile), their ICS proformas, a profile RL, and the completed ICSs. The ICS proformas are derived from their respective specifications by converting the static conformance requirements into questions presented in a tabular format. The profile RL is derived from both the profile and the relevant ICS proformas by presenting the profile requirements as changes in status values. Finally, the ICSs are derived from the ICS proformas by providing appropriate answers to the questions.

6.5.2 Base specifications

Figure 5 highlights the part of the general picture related to base specifications. This shows the base specifications (for protocols and information objects), their ICS proformas and their ICSs.

6.5.3 Profile specifications

Figure 6 highlights the part of the general picture related to the production of a profile specification based on the relevant protocol and information object specifications.

6.5.4 Profile ICS proformas

Profile specifications do not provide a single ICS proforma for the whole profile. Instead profile specifications

a) reference the relevant PICS proformas and information object ICS proformas;

b) specify a profile specific ICS proforma if necessary to ask additional questions;

c) specify a profile RL to modify the status values where appropriate.

This complete collection of ICS proformas plus the profile RL is called the profile ICS proforma. It is highlighted in figure 7 and formula 1 below (where: Σ means "set of all relevant" and [...] means "optional"):

$$\text{Profile ICS proforma} = \Sigma(\text{PICS proformas}) + \Sigma(\text{Information Object ICS proformas}) + [\text{Profile Specific ICS proforma}] + \text{Profile RL} \quad (1)$$

NOTE - The profile RL may contain within it the profile RL of a common (sub)profile. Similarly, the profile specific ICS proforma may contain within it the profile specific ICS proforma for a common (sub)profile. See 8.7.3 and 8.7.4.

Profile specifications may include not just the profile RL and any necessary profile specific ICS proforma, but also the whole profile ICS proforma. However, if the profile ICS proforma is included in the profile specification, then the copies of the base specification ICS proformas shall be informative; the normative versions of the base specification ICS proformas shall be the ones specified for the base specifications. Nevertheless, it may be useful to include copies of these ICS proformas in the profile specification, in order to ensure that implementors of the profile have ready access to the correct versions of the ICS proformas for the profile.

NOTE - This is particularly true for the common (sub)profile.

6.5.5 Profile ICS

A profile ICS is a profile ICS proforma with all the relevant answers provided for a given system. Thus, a profile ICS consists of the set of relevant PICSs and information object ICSs, the profile specific ICS if any, plus the profile RL, as highlighted in figure 8 and formula 2 below (where: Σ means "set of all relevant" and [...] means "optional"):

$$\text{Profile ICS} = \Sigma(\text{PICS}) + \Sigma(\text{Information Object ICS}) + [\text{Profile Specific ICS}] + \text{Profile RL} \quad (2)$$

The profile RL specifies restrictions on answers in each of the PICSs and information object ICSs to meet the requirements of the profile specification

6.5.6 Profile specific information

To complete this overview of the relationships between OSI specifications and their related ICS proformas and ICSs, figure 9 highlights the part of the general picture which is specific to a profile. This shows the profile specification, the profile specific ICS proforma, the profile RL and the profile specific ICS.

6.6 SCS proformas

Figure 10 shows a graphic representation of an SCS for a system supporting two profiles, three protocols and three information objects. Profile A comprises of protocols 1, 2 and 3 with information objects X and Y, whilst profile B comprises protocols 1, 2 and 3 with information object Z. The SCS refers to all these OSI specifications plus the related ICSs, SCTRs, PCTRs and MCS if relevant. The SCS also refers to the related SCTR(s) and PCTR(s), if any, resulting from previous test campaigns for some of the relevant specifications implemented in the same SUT, if any.

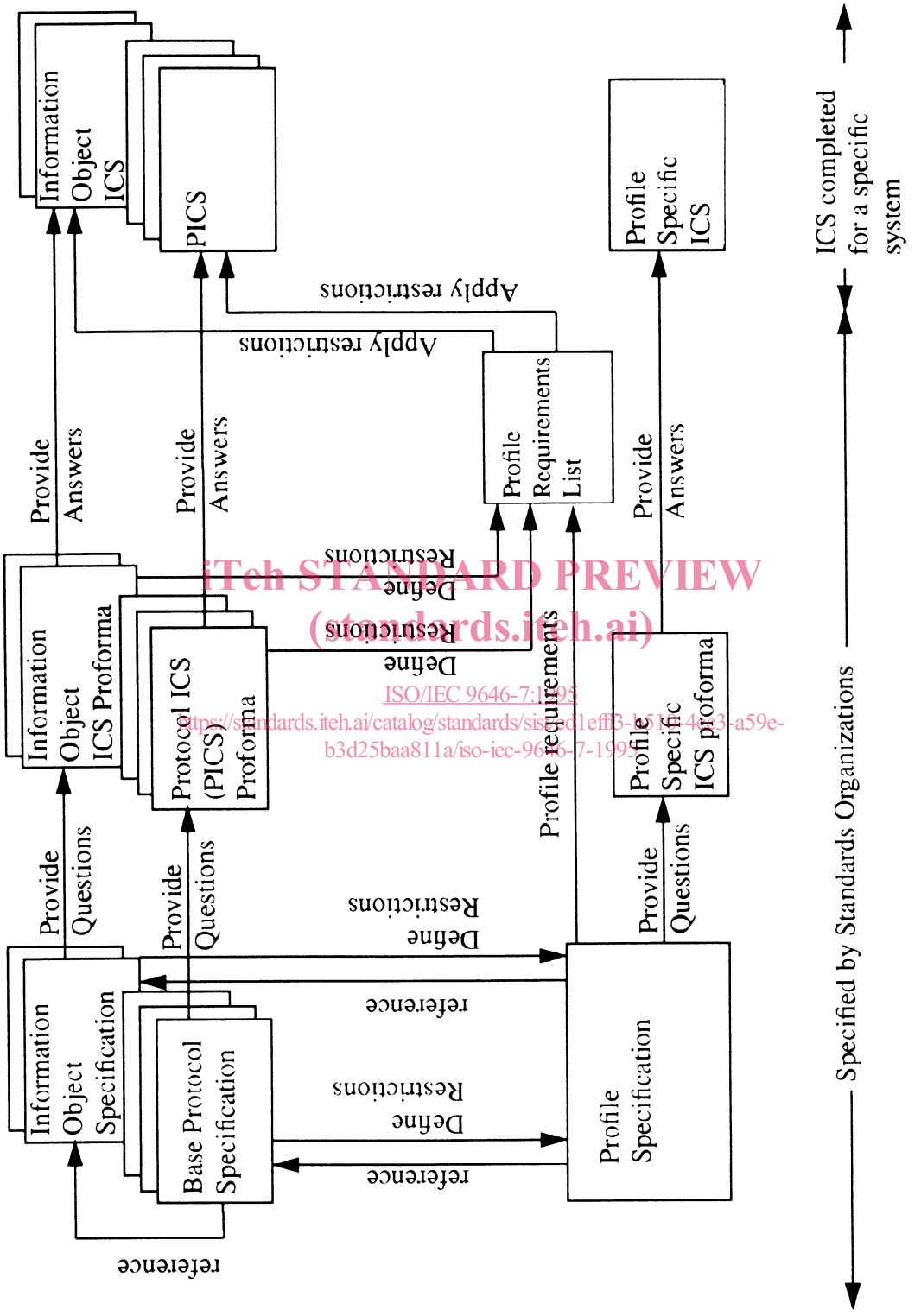

Figure 4 - Relationships between specifications, ICS proformas and ICSs