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Konceptualni model in taksonomija tehnike informacijskih sistemov

Conceptual model and taxonomy for information systems engineering

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35.240.01	Uporabniške rešitve informacijske tehnike in tehnologije na splošno	Application of information technology in general
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Conceptual Model and Taxonomy for
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This CEN REPORT has been prepared by Technical Committee CEN/TC 311 "Information Systems Engineering (ISE)" and has been approved by CEN on 1997-01-17.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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Secretariat of CEN/TC311

Information Systems Engineering

PREFACE

This report is the work of a CEN Project Team that was tasked with the development of a conceptual model and taxonomy for information systems engineering (ISE).

The purpose of this work is to facilitate the development of ISE standards to support the needs of European Union organizations involved in ISE, or whose business operations depend on the quality and availability of information systems.

The work was supervised by CEN Technical Committee TC311 and has been accepted as a satisfactory conclusion to the project by BTS/7 and SOGITS. BTS/7 is responsible for CEN standardization work in this general area and SOGITS is a committee representing senior government officials from member bodies of CEN.

The report is published and distributed in accordance with the provisions of CEN internal Regulations, Part II paragraph 2.1.5, as a matter of technical interest to a wider audience than TC311 alone.

The report is published exactly as provided by the Project Team. Comments received from national body members are included in annex E and should be taken into account when the report is used. Further comments on the report are hereby invited and should be sent to the TC311 Secretariat.

The reader should further note that the report will be maintained as time and resources permit, for example when ISE survey results become available or when ISE standardization work makes this appropriate. In order to ascertain the precise status of the report and the availability of any later versions, the TC311 Secretariat should be contacted.

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Foreword

Recognising there was a problem Europe needed to address, the Commission of the European Communities mandated CEN¹ to set up a project team to investigate Europe's requirements for standards in the field of Information Systems Engineering (ISE). In its approved final report (May 1991), the project team identified urgent reasons for ISE standardisation in Europe relating to the process of creating a single market in countries with diverse languages, cultures, business practices and system engineering methods. Although components of ISE standardisation were being addressed by various national and international standards bodies, nobody was looking at ISE as a whole.

This report led to the creation of CEN/BT WG63 to define the way forward. In its final report, WG63 proposed that a CEN Technical Committee be set up to undertake the ISE standardisation programme. As a result, CEN/TC 311 was established in June 1993.

CEN/TC 311's scope is standardisation in the field of ISE. Its role is to support Europe's business, economic, political, cultural and legislative needs by identifying the role of and need for existing or new agreed standards in the field of ISE and encouraging and enabling their preparation and application. The use of good ISE standards in Europe will:

- contribute to the removal of barriers to trade and overcome language and cultural barriers, enabling organisations to compete on equal terms throughout Europe;
- support the establishment of information systems needed to implement the single European market;
- provide long term economic benefits as European companies influence the development of products world-wide;
- reduce the risks associated with ISE products, with benefits to both the acquirers and the providers of Europe's information systems;
- contribute to the efficiency of ISE in Europe in order to increase Europe's competitiveness in the global market.

This document addresses the terms of the CEC mandate SOGITS N695.2 SOGT 93/45.2:

"to produce a conceptual model and corresponding taxonomy to ensure the coherence and completeness of standards work in the ISE area, taking into account the user requirements."

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Table of Contents

1. SCOPE AND FIELD OF APPLICATION	8
1.1 SCOPE	8
1.2 AUDIENCE	8
1.3 RATIONALE AND PURPOSE	8
1.3.1 <i>Structure</i>	9
1.4 SUMMARY	9
1.4.1 <i>The ISE conceptual model and taxonomy</i>	10
1.4.2 <i>Using the ISE conceptual model and taxonomy</i>	12
2. NORMATIVE REFERENCES	14
3. DEFINITIONS	15
4. SYMBOLS	19
4.1 CONCEPTUAL MODEL NOTATIONS AND CONVENTIONS	19
4.2 TAXONOMY NOTATION	20
5. ABBREVIATIONS AND ACRONYMS	21
6. THEORETICAL FOUNDATION OF THE ISE CONCEPTUAL MODEL	24
6.1 SYSTEMS, PROCESSES, PRODUCTS AND RESOURCES	24
6.2 DATA, INFORMATION AND INFORMATION SYSTEMS	25
6.3 SYSTEMS AND SUB-SYSTEMS	26
7. THE CONCEPTUAL MODEL OF ISE	28
7.1 THE TOP LEVEL OF THE ISE CONCEPTUAL MODEL	28
7.1.1 <i>The systems and context of ISE</i>	28
7.1.2 <i>Interactions between the systems</i>	30
7.2 PRODUCTION SUB-SYSTEMS	32
7.2.1 <i>Analysis</i>	34
7.2.2 <i>Design</i>	34
7.2.3 <i>Construction</i>	34
7.2.4 <i>Installation</i>	35
7.2.5 <i>Adaptations of ISs and ISEs</i>	35
7.2.6 <i>Direction</i>	36
7.2.7 <i>Assessment</i>	37
7.2.8 <i>Support</i>	38
7.3 THE PROCESSES, PRODUCTS AND RESOURCES OF THE FOUR SYSTEMS	38
7.3.1 <i>Processes, products and resources of the OS</i>	38
7.3.2 <i>Processes, products and resources of the IS</i>	39
7.3.3 <i>Processes, products and resources of the ISES</i>	39
7.3.4 <i>The processes, products and resources of the ISETS</i>	40
7.4 THE QUALITIES	42
7.4.1 <i>ISE product qualities</i>	42
7.4.2 <i>Information product qualities</i>	47
7.4.3 <i>Process qualities</i>	48
7.4.4 <i>Human resource qualities</i>	49
8. THE ISE TAXONOMY	52
8.1 TAXONOMY BACKGROUND	52
8.2 THE ISE TAXONOMIES	52
8.2.1 <i>Taxonomy of ISE entities</i>	52
8.2.2 <i>Taxonomy of ISE qualities</i>	57
8.3 AN ALTERNATIVE REPRESENTATION OF THE TAXONOMY OF ISE ENTITIES	57

9. USING THE LANGUAGE	63
9.1 THE INTEROPERABILITY ISSUE	63
9.1.1 <i>Definition of interoperability</i>	63
9.1.2 <i>Requirements for interoperability</i>	64
9.1.3 <i>Conclusion</i>	66
9.2 THE DATA QUALITY ISSUE	67
9.2.1 <i>The interchange of data between ISs</i>	67
9.2.2 <i>Mathematical statistics and ISE</i>	68
9.2.3 <i>Research and standardisation projects</i>	69
9.3 THE DISTRIBUTED SYSTEMS ISSUE	70
9.3.1 <i>OSI and ODP</i>	70
9.3.2 <i>The management of distributed information systems</i>	71
10. USING THE PICTURES	72
11. USING THE TAXONOMIES	74
11.1 CLASSIFICATION OF INFORMATION SYSTEMS	74
11.2 CLASSIFICATION OF THE OTHER CONCEPTS OF THE ISE DOMAIN	74
11.3 DEVELOPING A COMPARISON MATRIX	75
12. SUPPORTING STANDARDS MANAGEMENT	76
12.1 RELATING STANDARDS TO EACH OTHER	76
12.1.1 <i>Example of related standards</i>	77
12.2 DETERMINING STANDARDS COVERAGE	79
12.3 RELATING USER REQUIREMENT CATEGORIES TO STANDARDS	79
12.3.1 <i>The DISC 'Framework for User Requirements'</i>	79
12.3.2 <i>Mapping user requirements to the ISE conceptual model</i>	82
12.4 SCOPING ISE	82
12.4.1 <i>ISE</i>	82
12.4.2 <i>ISE standardisation</i>	83
12.4.3 <i>CEN/TC 311</i>	83
13. ANNEX A ISE IN CONTEXT	84
13.1 INFORMATION SYSTEMS	84
13.2 THE ENGINEERING (PROVISION) OF INFORMATION SYSTEMS	86
13.3 INFORMATION SYSTEM ADAPTATIONS	86
13.4 THE IMPORTANCE OF INFORMATION SYSTEMS ENGINEERING	87
13.5 THE IMPORTANCE OF ISE STANDARDS	87
13.6 THE ROLE OF CEN/TC 311	88
14. ANNEX B AREAS OF USER REQUIREMENT	90
14.1 COLLABORATION	90
14.2 TRADE BARRIERS	90
14.3 SMALL/MEDIUM ENTERPRISES	91
14.4 ISE TECHNIQUES	91
14.5 ISE TOOLS	91
14.6 QUALITY	92
14.7 MEASUREMENT	92
14.8 EVALUATION	93
14.8.1 <i>What is evaluated</i>	93
14.8.2 <i>Neutrality of the evaluators</i>	93
14.8.3 <i>Proximity to reality</i>	94
14.8.4 <i>Source of knowledge</i>	94
14.8.5 <i>Method of evaluation</i>	94
14.9 PREDICTABILITY	95
15. ANNEX C STANDARDS COMMITTEES RELATED TO ISE	96

16. ANNEX D BIBLIOGRAPHY.....	97
-------------------------------	----

17. ANNEX E COMMENTS FROM NATIONAL STANDARDIZATION BODIES.....	101
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Figures

FIGURE 3-1 THE CYCLE OF NEEDS.....	11
------------------------------------	----

FIGURE 3-2 POSITIONING OTHER STANDARDS WORK IN THE ISE DOMAIN	13
---	----

FIGURE 8-1 ORGANISATION AND INFORMATION SYSTEMS AND SUB-SYSTEMS	27
---	----

FIGURE 9-1 THE SYSTEMS AND CONTEXT OF ISE.....	29
--	----

FIGURE 9-2 INTERACTIONS BETWEEN THE SYSTEMS	31
---	----

FIGURE 9-3 PRODUCTION AND CONTROL SUB-SYSTEMS.....	33
--	----

FIGURE 9-4 PRODUCTION PROCESSES	33
---------------------------------------	----

FIGURE 9-5 CONTROL PROCESSES.....	36
-----------------------------------	----

FIGURE 12-1 POSITIONING OTHER STANDARDS WORK IN THE ISE DOMAIN.....	ERROR! BOOKMARK NOT DEFINED.
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FIGURE 14-1 A MAPPING OF STANDARDS CONCERNED WITH RELIABILITY	82
---	----

FIGURE 14-2 THE DISC FRAMEWORK FOR USER REQUIREMENTS'	85
---	----

FIGURE 15-1 THE INFORMATION DEMAND AND SUPPLY CYCLE.....	89
--	----

SIST CR 12804:2003

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1. Scope and field of application

1.1 Scope

The scope of this document is information systems engineering, approached from the perspective of a description of the concepts of ISE and the classification of those concepts in a taxonomy.

Information systems engineering concerns the provision of information systems to organisations, including both the provision of development services and the provision of operational services.

1.2 Audience

The audience for the document includes:

- IS procurers and users;
- ISE practitioners;
- ISE researchers and educators;
- CEN/TC 311;
- CEN/BT S7;
- SOGITS and its associated committees;
- CEN member bodies;
- Other interested standards makers;
- Euromethod developers and users.

1.3 Rationale and purpose

The wide scope of ISE standardisation and the number of standards organisations working in the field make the job of co-ordinating ISE standards development a challenging one. In these circumstances it is important to have agreed reference documents, including carefully defined terminology. Such reference documents are variously called conceptual models, reference models, frameworks and architectures. They are intended primarily to be used by standards-makers so that they can communicate their ideas, test the overlap and cohesion of their work and establish consensus across the industry.

The purpose of the '*Conceptual Model and Taxonomy for Information Systems Engineering*' is to provide a support tool for activities such as:

- promoting a common understanding of ISE, its concepts and its terminology throughout Europe;
- promoting understanding of the scope and objectives of ISE standardisation throughout Europe;
- facilitating co-operative working in the field of ISE between different organisations in Europe and worldwide;
- promoting the European view of ISE to the rest of the world;
- facilitating the translation of user requirements to areas of ISE standardisation and certification;
- identifying areas of standards and profiles needs, gaps and overlaps;
- assisting CEN/TC 311 in the exercise of its mission and the fulfilment of its objectives.

The document has other potential uses, for example:

- assisting those standards bodies which monitor the work of CEN/TC 311;
- identifying areas of R&D project need, gaps, relationships and overlaps.

The '*Conceptual Model and Taxonomy for Information Systems Engineering*' will benefit Europe's ISE providers and users by helping CEN/TC 311 to encourage and enable the provision of consistent,

coherent and complete standards that meet Europe's business, economic, political, cultural and legislative needs.

1.3.1 Structure

Sections 1 to 5 contain introductory material. The body of the document is divided into two parts:

Part 1 The ISE conceptual model and taxonomy

Essential reading for anyone using the document for reference purposes.

Section 6 Theoretical foundation of the ISE conceptual model

The theoretical foundation on which the ISE conceptual model and taxonomy is based.

Section 7 The conceptual model of ISE

The ISE conceptual model defined and described.

Section 8 The ISE taxonomy

ISE taxonomies defined and described.

Part 2 Using the ISE conceptual model and taxonomy

Useful reading for anyone applying the ISE conceptual model and taxonomy in standards-related and other tasks. (standards.iteh.ai)

Section 9 Using the language

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Using the ISE conceptual model and taxonomy as a language to facilitate communication.

Section 10 Using the pictures

Using the pictures from the ISE conceptual model for scoping and positioning tasks.

Section 11 Using the taxonomies

Using the ISE taxonomies for classification and comparison tasks.

Section 12 Supporting standards management

Using the ISE conceptual model and taxonomy in tasks relating to the management of standards and standardisation.

The annexes contain background material about ISE, examples of user requirements, a list of some standards committees working in the ISE domain and a bibliography.

1.4 Summary

This section summarises the content of Parts 1 and 2 of the document.

1.4.1 *The ISE conceptual model and taxonomy*

To produce an ISE conceptual model adequate for the purposes listed in section 1.3, four systems have to be considered:

- the information system;
- the organisation system in which the information system is used;
- the ISE system which develops the information system;
- the ISE technology system which develops the technology used by the ISE system.

The four systems in their market context are connected in a cycle of needs and satisfaction of needs (the top level of the ISE conceptual model—see Figure 1-1). The satisfaction of needs is achieved by products and services which are qualified by attributes or qualities. Important qualities from the point of view of ISE are those of the target information system, for example, its dependability, its efficiency and its testability. Such qualities, seen as requirements arising from the organisation system and its market context, affect the way in which information systems are engineered. The way information systems are engineered in turn places requirements on the ISE technology system to provide appropriate products and services to support that engineering.

The ISE taxonomies—the classification of ISE concepts—are derived from the conceptual model. The taxonomies are another way of stating the conceptual model in terms of the relationships ‘is a kind of’ (specialisation) and ‘consists of’ (containment). Stated informally, examples from the taxonomy of ISE entities are:

- an ISE system consists of a production sub-system and a control sub-system;
- a production sub-system consists of production products, production processes and production resources;
- a formalism is a kind of ISE technology product.

This kind of taxonomy can be used in standards management activities involving the classification and comparing of standards.

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A second taxonomy, based on the qualities of ISE entities, is useful for classifying such things as information systems.

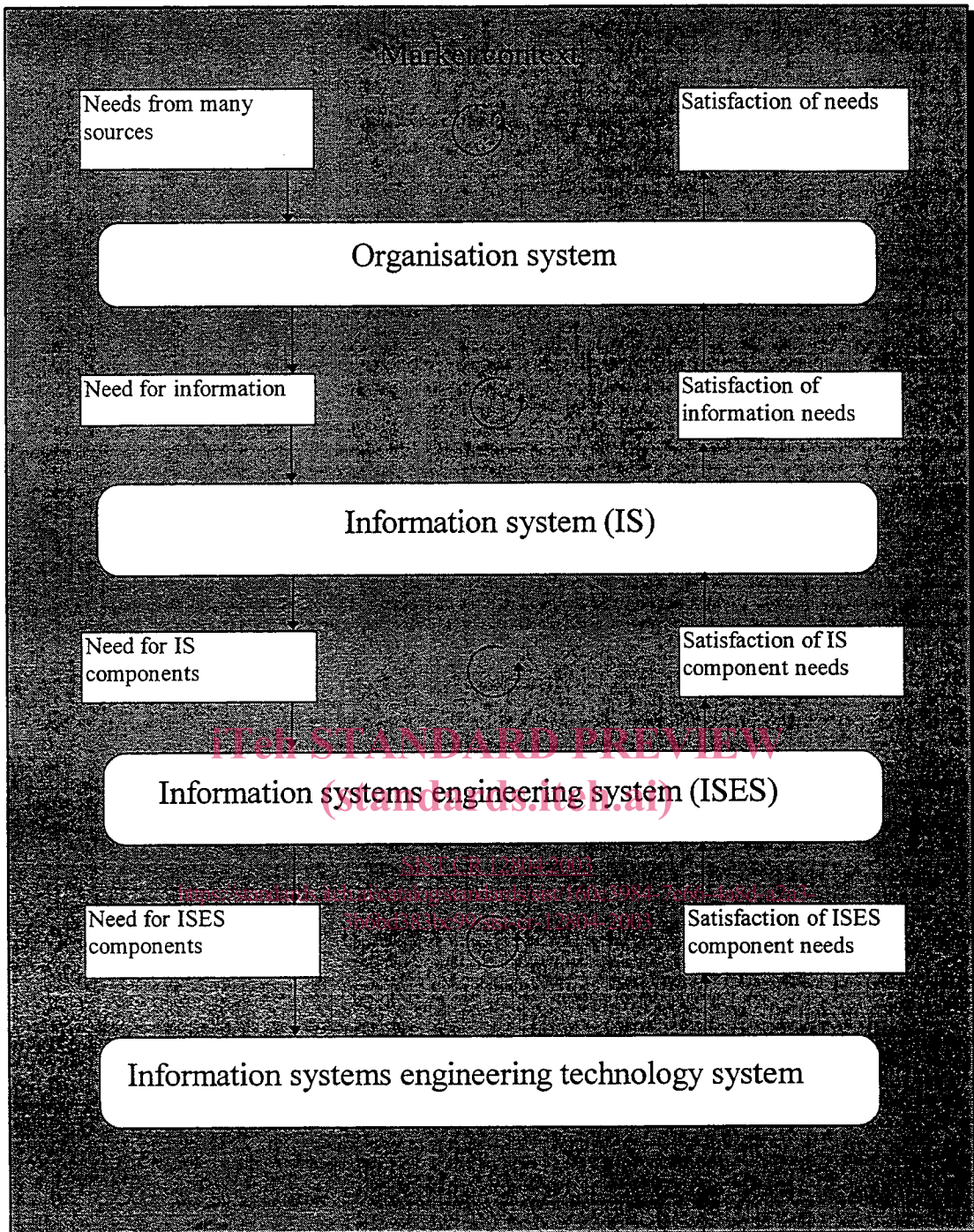


Figure 1-1 The cycle of needs

1.4.2 Using the ISE conceptual model and taxonomy

There are three main kinds of use to be made of the ISE conceptual model and taxonomy:

- 1 **A language to facilitate communication:** This involves utilising the framework, concepts and terminology of the ISE conceptual model in discussions relating to ISE. Here the ISE conceptual model and taxonomy provides a common language and shared world view or understanding that will facilitate communication, debate and discussion of issues. Examples of this kind of use are in:
 - promoting a common understanding of ISE, its concepts and its terminology throughout Europe;
 - promoting understanding of the scope and objectives of ISE standardisation throughout Europe;
 - facilitating co-operative working in the field of ISE between different organisations in Europe and worldwide;
 - promoting the European view of ISE to the rest of the world.
- 2 **Pictures to facilitate elucidation of relationships:** A different kind of use concerns the various kinds of pictures that can be constructed from the text of the conceptual model. It is possible to position research projects, standardisation work items, models, frameworks, etc. in such pictures and thereby shed light on the scope and relationships of the items. A picture used for positioning need not be formal and the positioning process will not be rigorous. The picture provides a catalyst to discussion, not an end in itself. Examples of this kind of use are in:
 - facilitating the translation of user requirements to areas of ISE standardisation and certification;
 - identifying areas of standards and profiles needs, gaps and overlaps.
- 3 **Matrices or models to facilitate formal comparisons:** The more formal use concerns the construction of matrices from the ISE taxonomies and placing items for comparison etc. in the cells of the matrices. Another formal use involves the construction of a model of, for example, a standard, and comparing it for consistency and divergence with an equivalent model developed from the ISE conceptual model. Examples of this kind of use are in:
 - facilitating the translation of user requirements to areas of ISE standardisation and certification;
 - identifying areas of standards and profiles needs, gaps and overlaps.

Figure 1-2 shows how a picture taken from the conceptual model can be used to make a preliminary positioning of standards in the ISE domain (see item 2 above).

Standards work positioned in Figure 1-2 are:

- | | |
|----|---|
| 1 | ISO 9000/EN 29000 |
| 2 | EDI |
| 3 | OSI |
| 4 | ETSI |
| 5 | IRDS |
| 6 | Security |
| 7 | SPICE |
| 8 | POSIX |
| 9 | PCTE |
| 10 | Euromethod |
| 11 | Guidelines for selection of CASE tools (ISO/IEC JTC1 SC7) |
| 12 | EPHOS |
| 13 | Quality of service |
| 14 | DISC Framework for User Requirements |

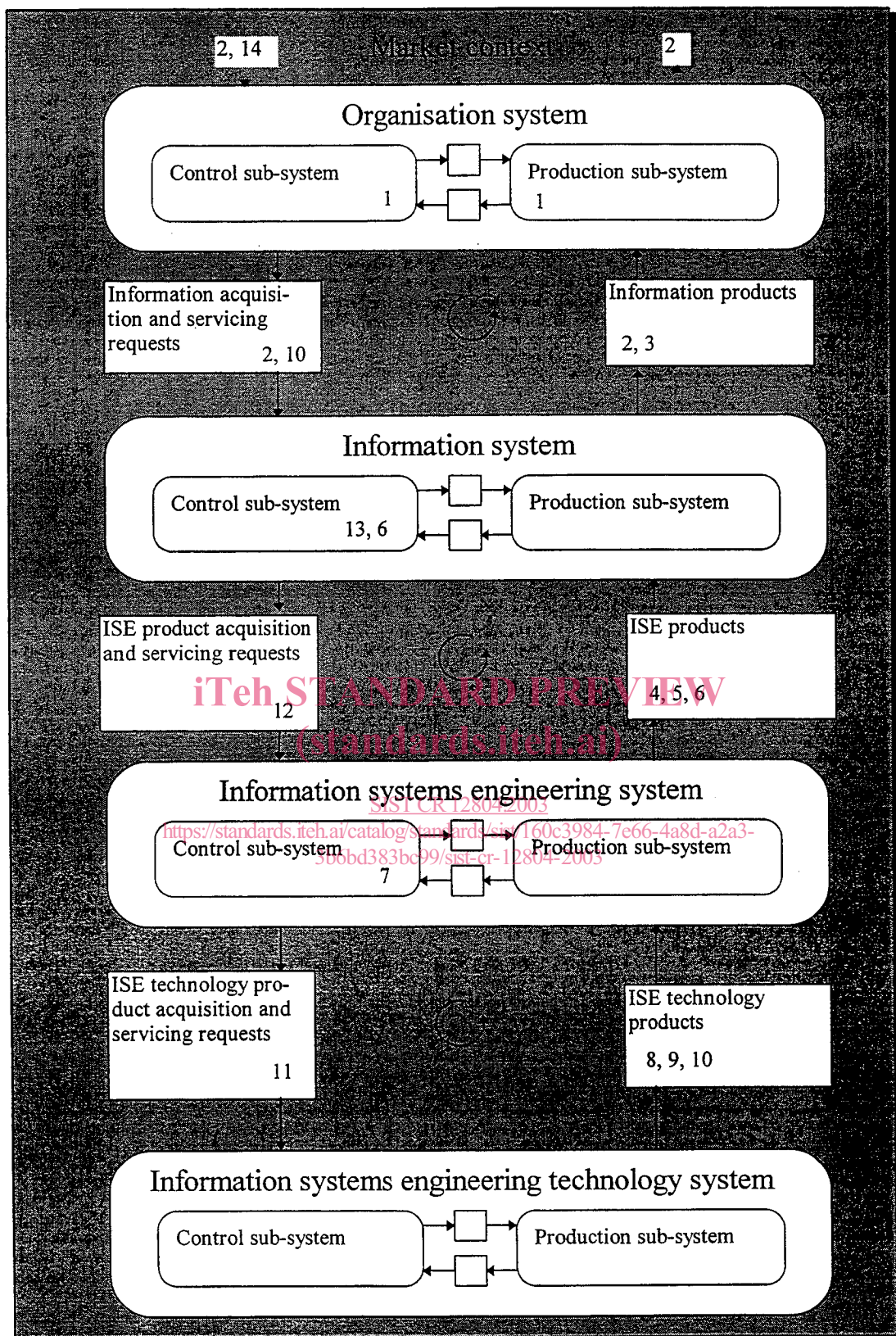


Figure 1-2 Positioning other standards work in the ISE domain