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**Information technology — Open distributed  
processing — Reference model —  
Enterprise language**

*Technologies de l'information — Traitement distribué ouvert — Modèle de  
référence — Langage d'entreprise*

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Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.ch](mailto:copyright@iso.ch)  
Web [www.iso.ch](http://www.iso.ch)

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## CONTENTS

1	Scope .....	1
2	Normative references.....	1
3	Definitions .....	1
	3.1 Definitions from ODP standards .....	1
	3.2 Definitions from ODP standards extended in this specification.....	3
4	Abbreviations.....	3
5	Conventions .....	3
6	Concepts .....	3
	6.1 System concepts .....	4
	6.2 Community concepts.....	4
	6.3 Behaviour concepts .....	4
	6.4 Policy concepts.....	4
	6.5 Accountability concepts .....	5
7	Structuring rules .....	5
	7.1 Overall structure of an enterprise specification .....	5
	7.2 Contents of an enterprise specification.....	6
	7.3 Community rules .....	7
	7.4 Enterprise object rules.....	8
	7.5 Common community types.....	9
	7.6 Lifecycle of a community.....	9
	7.7 Objective rules.....	10
	7.8 Behaviour rules.....	10
	7.9 Policy rules .....	12
	7.10 Accountability rules.....	14
8	Compliance, completeness and field of application.....	15
	8.1 Compliance.....	15
	8.2 Completeness.....	15
	8.3 Field of application.....	15
9	Enterprise language compliance .....	16
10	Conformance and reference points .....	16
11	Consistency rules.....	16
	11.1 Viewpoint correspondences.....	16
	11.2 Enterprise and information specification correspondences .....	17
	11.3 Enterprise and computational specification correspondences .....	18
	11.4 Enterprise and engineering specification correspondences .....	18
	Index .....	20

## 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 3.

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 International Standard 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 15414 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and system engineering*, in collaboration with ITU-T. The identical text is published as ITU-T Rec. X.911.

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## Introduction

The rapid growth of distributed processing has led to the adoption of the Reference Model of Open Distributed Processing (RM-ODP). This Reference Model provides a co-ordinating framework for the standardization of open distributed processing (ODP). It creates an architecture within which support of distribution, interworking, and portability can be integrated. This architecture provides a framework for the specification of ODP systems.

The Reference Model of Open Distributed Processing is based on precise concepts derived from current distributed processing developments and, as far as possible, on the use of formal description techniques for specification of the architecture.

This Recommendation | International Standard refines and extends the definition of how ODP systems are specified from the enterprise viewpoint, and is intended for the development or use of enterprise specifications of ODP systems.

### 0.1 RM-ODP

The RM-ODP consists of:

- Part 1: ITU-T Rec. X.901 | ISO/IEC 10746-1: **Overview**: which contains a motivational overview of ODP, giving scoping, justification and explanation of key concepts, and an outline of the ODP architecture. It contains explanatory material on how the RM-ODP is to be interpreted and applied by its users, who may include standards writers and architects of ODP systems. It also contains a categorization of required areas of standardization expressed in terms of the reference points for conformance identified in ITU-T Rec. X.903 | ISO/IEC 10746-3. This part is not normative.
- Part 2: ITU-T Rec. X.902 | ISO/IEC 10746-2: **Foundations**: which contains the definition of the concepts and analytical framework for normalized description of (arbitrary) distributed processing systems. It introduces the principles of conformance to ODP standards and the way in which they are applied. This is only to a level of detail sufficient to support ITU-T Rec. X.903 | ISO/IEC 10746-3 and to establish requirements for new specification techniques. This part is normative.
- Part 3: ITU-T Rec. X.903 | ISO/IEC 10746-3: **Architecture**: which contains the specification of the required characteristics that qualify distributed processing as open. These are the constraints to which ODP standards must conform. It uses the descriptive techniques from ITU-T Rec. X.902 | ISO/IEC 10746-2. This part is normative.
- Part 4: ITU-T Rec. X.904 | ISO/IEC 10746-4: **Architectural semantics**: which contains a formalization of the ODP modelling concepts defined in ITU-T Rec. X.902 | ISO/IEC 10746-2 clauses 8 and 9. The formalization is achieved by interpreting each concept in terms of the constructs of one or more of the different standardized formal description techniques. This part is normative.
- ITU-T Rec. X.911 | ISO/IEC 15414: **Enterprise language**: this Recommendation | International Standard.

### 0.2 This Recommendation | International Standard

Part 3 of the Reference Model, ITU-T Rec. X.903 | ISO/IEC 10746-3, defines a framework for the specification of ODP systems comprising:

- 1) five viewpoints, called enterprise, information, computational, engineering and technology, which provide a basis for the specification of ODP systems;
- 2) a viewpoint language for each viewpoint, defining concepts and rules for specifying ODP systems from the corresponding viewpoint.

The purpose of this Recommendation | International Standard is to:

- Refine and extend the enterprise language defined in ITU-T Rec. X.903 | ISO/IEC 10746-3 to enable full enterprise viewpoint specification of an ODP system;
- Explain the correspondences of an enterprise viewpoint specification of an ODP system to other viewpoint specifications of that system; and
- Ensure that the enterprise language when used together with the other viewpoint languages is suitable for the specification of a concrete application architecture to fill a specific business need.

This Recommendation | International Standard uses concepts taken from ITU-T Recommendations X.902 and X.903 | ISO/IEC 10746-2 and 10746-3 and structuring rules taken from clause 5 of ITU-T Rec. X.903 | ISO/IEC 10746-3; it introduces refinements of those concepts, additional viewpoint-specific concepts, and prescriptive structuring rules for enterprise viewpoint specifications. The additional viewpoint-specific concepts are defined using concepts from ITU-T Recommendations X.902 and X.903 | ISO/IEC 10746-2 and 10746-3.

### 0.3 Overview and motivation

The purpose of this Recommendation | International Standard is to provide a common language (a set of terms and structuring rules) to be used in the preparation of an enterprise specification capturing the purpose, scope and policies for an ODP system. Such an enterprise specification forms part of the specification of an ODP system in terms of the set of viewpoints defined by ITU-T Rec. X.903 | ISO/IEC 10746-3. The primary audience for this Recommendation | International Standard consists of those who prepare and use such specifications.

An enterprise specification is part of an ODP system specification. It can describe any or all of:

- an existing system;
- an anticipated future structure or behaviour of that existing system;
- a system to be created within some environment.

The motivation for a standard enterprise language is to support standardized techniques for specification in order to improve communication and help create specifications that are consistent overall. The enterprise language provides the terms and structuring rules to specify the purpose, scope and policies for an ODP system in a manner that is meaningful for the stakeholders for that system, including the owners, the users, the developers and the maintainers.

An enterprise specification describes the structure and behaviour of the system within its environment. It explicitly includes those aspects of the environment that influence the behaviour of the ODP system – environmental constraints are captured as well as usage and management rules. Policies about potential changes in the system that may rule its future evolution may also be included. Such an environment can be a technical environment (e.g. the software and hardware environment of a service component) or a social or business organization (e.g. a group of co-operating companies, a particular service inside a company).

When preparing a specification, there are many approaches that are used for understanding, reaching agreement about, and specifying systems in the context of the organizations of which they form a part. Many of these approaches fall into the categories often referred to as analysis or requirements specification. They can provide useful insights into both the organization under consideration and the requirements for systems to support it, but they often lack the rigour, consistency and completeness needed for thorough specification. It is a key objective of this Recommendation | International Standard to provide a way of relating the commonly used concepts and underlying principles of such approaches to the modelling framework of the RM-ODP.

An important objective of an enterprise specification is to support an agreement (for example, as part of the contract for the supply of a system) between the potential owners and users of an ODP system and the provider of that system. Both parties should be able to write, read and discuss such a specification, the owners and users to be sure of the expected structure and behaviour of the system that they will get, and the provider to be clear about the structure and behaviour of the system being provided.

Enterprise specifications can also be used at other phases of the system life-cycle. The specification can, for example, be used at system run-time to control agreements between the system and its users, to establish new agreements according to the same contract structure and to establish federations.

Finally, in the context of the current trend to integrate existing systems into global networks, where the functionality of interest spans multiple organizations, the enterprise language provides means to specify the joint agreement regarding the structure and behaviour of the ODP systems within and between these organizations.

The concepts and structuring rules this Recommendation | International Standard provides may be used for development of software engineering methodologies and tools exploiting ODP viewpoint languages, and for development of textual or graphical notations for the ODP enterprise language itself. For these purposes, this Recommendation | International Standard provides rules for the information content of an enterprise specification and the grouping of that information. Further requirements on the relationships between enterprise language concepts and their correspondences to concepts in other viewpoints are specific to the methodologies, tools or notations to be developed.

**INTERNATIONAL STANDARD  
ITU-T RECOMMENDATION**

**Information technology – Open distributed processing –  
Reference model – Enterprise language**

## 1 Scope

This Recommendation | International Standard provides:

- a) a language (the enterprise language) comprising concepts, structures, and rules for developing, representing, and reasoning about a specification of an ODP system from the enterprise viewpoint (as defined in ITU-T Rec. X.903 | ISO/IEC 10746-3);
- b) rules which establish correspondences between the enterprise language and the other viewpoint languages (defined in ITU-T Rec. X.903 | ISO/IEC 10746-3) to ensure the overall consistency of a specification.

The language is specified to a level of detail sufficient to enable the determination of the compliance of any modelling language to this Recommendation | International Standard and to establish requirements for new specification techniques.

This Recommendation | International Standard is a refinement and extension of ITU-T Rec. X.903 | ISO/IEC 10746-3, clauses 5 and 10, but does not replace them.

This Recommendation | International Standard is intended for use in preparing enterprise viewpoint specifications of ODP systems, and in developing notations and tools to support such specifications.

As specified in clause 5 of ITU-T Rec. X.903 | ISO/IEC 10746-3, an enterprise viewpoint specification defines the purpose, scope and policies of an ODP system. (see also 3-5.0)

## 2 Normative references

[ISO/IEC 15414:2002](#)

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The following Recommendations and International Standards contain provisions which, through reference in this text, constitute provisions of this Recommendation | International Standard. At the time of publication, the editions indicated were valid. All Recommendations and Standards are subject to revision, and parties to agreements based on this Recommendation | International Standard are encouraged to investigate the possibility of applying the most recent edition of the Recommendations and Standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards. The Telecommunication Standardization Bureau of the ITU maintains a list of the currently valid ITU-T Recommendations.

### Identical ITU-T Recommendations | International Standards

- ITU-T Recommendation X.902 (1995) | ISO/IEC 10746-2:1996, *Information technology – Open Distributed Processing – Reference Model: Foundations.*
- ITU-T Recommendation X.903 (1995) | ISO/IEC 10746-3:1996, *Information technology – Open Distributed Processing – Reference Model: Architecture.*
- ITU-T Recommendation X.904 (1997) | ISO/IEC 10746-4:1998, *Information technology – Open Distributed Processing – Reference Model: Architectural semantics.*

## 3 Definitions

### 3.1 Definitions from ODP standards

#### 3.1.1 Modelling concept definitions

This Recommendation | International Standard makes use of the following terms as defined in ITU-T Rec. X.902 | ISO/IEC 10746-2.

- action;
- behaviour (of an object);

## ISO/IEC 15414:2002 (E)

- composite object;
- composition;
- configuration (of objects);
- conformance;
- conformance point;
- contract;
- <X> domain;
- entity;
- environment contract;
- environment (of an object);
- epoch;
- establishing behaviour;
- instance (of a type);
- instantiation (of an <X> template);
- interface;
- internal action;
- invariant;
- liaison;
- location in time;
- object;
- obligation;
- ODP standards;
- ODP system;
- permission;
- prohibition;
- proposition;
- reference point;
- refinement;
- role;
- state (of an object);
- subtype;
- system;
- <X> template;
- terminating behaviour;
- type (of an <X>);
- viewpoint (on a system).

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### 3.1.2 Viewpoint language definitions

This Recommendation | International Standard makes use of the following terms as defined in ITU-T Rec. X.903 | ISO/IEC 10746-3.

- binder;
- channel;
- community;
- computational behaviour;
- computational binding object;
- computational object;



- computational interface;
- computational viewpoint;
- correspondence;
- dynamic schema;
- engineering viewpoint;
- enterprise viewpoint;
- <X> federation;
- information object;
- information viewpoint;
- interceptor;
- invariant schema **Error! Bookmark not defined.**;
- node;
- protocol object;
- static schema;
- stub;
- technology viewpoint;
- <viewpoint> language.

### 3.2 Definitions from ODP standards extended in this Specification

This Recommendation | International Standard extends the definition of the following term originally defined in ITU-T Rec. X.902 | ISO/IEC 10746-2, [2-11.2.7].

- policy.

The extended definition is in clause 6.

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## 4 Abbreviations

For the purposes of this Recommendation | International Standard, the following abbreviations apply.

ODP	Open distributed processing
RM-ODP	Reference Model of Open Distributed Processing (ITU-T Recommendations X.901 to X.904   ISO/IEC 10746 Parts 1-4)

## 5 Conventions

This Recommendation | International Standard contains references to Parts 2 and 3 of RM-ODP. For example, [2-9.4] is a reference to Part 2, (ITU-T Rec. X.902 | ISO/IEC 10746-2), subclause 9.4. These references are for the convenience of the reader.

This Recommendation | International Standard also contains some text which is a modification of text from Part 3, ITU-T Rec. X.903 | ISO/IEC 10746-3. Such text is marked by a reference like this: [see also 3-5.0]. The modifications are authoritative with respect to the enterprise language.

## 6 Concepts

The concepts of the enterprise language defined in this Recommendation | International Standard comprise:

- the concepts identified in 3.1.1 and 3.1.2 as they are defined in ITU-T Rec. X.902 | ISO/IEC 10746-2 and in ITU-T X.903 | ISO/IEC 10746-3;
- the concepts defined in this clause.

This clause defines new concepts and refines the definition of policy from ITU-T Rec. X.902 | ISO/IEC 10746-2, [2-11.2.7] The grouping into subclauses and the headings of the subclauses of this clause are not normative.

## 6.1 System concepts

**6.1.1 scope (of a system):** The behaviour that system is expected to exhibit.

**6.1.2 field of application (of a specification):** The properties the environment of the ODP system must have for the specification of that system to be used.

## 6.2 Community concepts

**6.2.1 objective (of an <X>):** Practical advantage or intended effect, expressed as preferences about future states.

NOTE 1 – Some objectives are ongoing, some are achieved once met.

NOTE 2 – In the text of ITU-T Rec. X.903 | ISO/IEC 10746-3 [3-5] the terms, purpose and objective, are synonymous. The enterprise language systematically uses the term, objective, and emphasizes the need of expressing objective in measurable terms.

**6.2.2 community object:** A composite enterprise object that represents a community. Components of a community object are objects of the community represented.

## 6.3 Behaviour concepts

**6.3.1 actor (with respect to an action):** An enterprise object that participates in the action.

NOTE – It may be of interest to specify which actor initiate that action.

**6.3.2 artefact (with respect to an action):** An enterprise object that is referenced in the action.

NOTE – An enterprise object that is an artefact in one action can be an actor in another action.

**6.3.3 resource:** An enterprise object which is essential to some behaviour and which requires allocation or may become unavailable.

NOTE 1 – Allocation of a resource may constrain other behaviours for which that resource is essential.

NOTE 2 – A consumable resource may become unavailable after some amount of use or after some amount of time (in case a duration or expiry has been specified for the resource).

**6.3.4 interface role:** A role of a community identifying behaviour which takes place with the participation of objects that are not a members of that community.

**6.3.5 process:** A collection of steps taking place in a prescribed manner and leading to an objective.

NOTE 1 – A process may have multiple starting points and multiple end points.

NOTE 2 – The prescribed manner may be a partially ordered sequence.

NOTE 3 – A process specification can be a workflow specification.

NOTE 4 – The activity structure concepts provided in 13.1 of ITU-T Rec. X.902 | ISO/IEC 10746-2 may be used, after substitution of 'step' for 'action' and 'process' for 'activity', to specify the structure of a process.

NOTE 5 – An enterprise specification may define types of processes and may define process templates.

**6.3.6 step:** An abstraction of an action, used in a process, that may leave unspecified objects that participate in that action.

## 6.4 Policy concepts

**6.4.1 policy:** A set of rules related to a particular purpose. A rule can be expressed as an obligation, an authorisation, a permission or a prohibition.

NOTE 1 – Not every policy is a constraint. Some policies represent an empowerment.

NOTE 2 – This definition refines 2-11.2.7 by adding authorization.

**6.4.2 authorization:** A prescription that a particular behaviour must not be prevented.

NOTE – Unlike a permission, an authorization is an empowerment.

**6.4.3 violation:** An action contrary to a rule.

NOTE – A rule or policy may provide behaviour to occur upon violation of that or some other rule or policy.

## 6.5 Accountability concepts

**6.5.1 party:** An enterprise object modelling a natural person or any other entity considered to have some of the rights, powers and duties of a natural person.

NOTE 1 – Examples of parties include enterprise objects representing natural persons, legal entities, governments and their parts, and other associations or groups of natural persons.

NOTE 2 – Parties are responsible for their actions and the actions of their agents.

The following concepts are used to identify actions which involve the accountability of a party.

**6.5.2 commitment:** An action resulting in an obligation by one or more of the participants in the act to comply with a rule or perform a contract.

NOTE – The enterprise object(s) participating in an action of commitment may be parties or agents acting on behalf of a party or parties. In the case of an action of commitment by an agent, the principal becomes obligated.

**6.5.3 declaration:** An action that establishes a state of affairs in the environment of the object making the declaration.

NOTE – The essence of a declaration is that, by virtue of the act of declaration itself and the authority of the object or its principal, it causes a state of affairs to come into existence outside the object making the declaration.

**6.5.4 delegation:** The action that assigns authority, responsibility or a function to another object.

NOTE – A delegation, once made, may later be withdrawn.

**6.5.5 evaluation:** An action that assesses the value of something.

NOTE 1 – For example, the act by which an ODP system assigns a relative status to some thing, according to estimation by the system.

NOTE 2 – Value can be considered in terms of usefulness, importance, preference, acceptability etc; the evaluated target may be, for example, a credit rating, a system state, a potential behaviour, etc.

**6.5.6 prescription:** An action that establishes a rule.

**6.5.7 agent:** An enterprise object that has been delegated (authority, responsibility, a function, etc.) by and acts for another enterprise object (in exercising the authority, carrying out the responsibility, performing the function, etc.).

NOTE 1 – An agent may be a party or may be the ODP system or one of its components. Another system in the environment of the ODP system may also be an agent.

NOTE 2 – The delegation may have been direct, by a party, or indirect, by an agent of the party having authorization from the party to so delegate.

**6.5.8 principal:** A party that has delegated (authority, a function, etc.) to another.

**6.5.9 contracting party (with respect to a contract):** A party that agrees to that contract.

## 7 Structuring rules

This clause refines and extends the structuring rules defined in subclause 5.2 of ITU-T Rec. X.903 | ISO/IEC 10746-3, as they apply to the concepts of community, enterprise object, objective, behaviour and policy. It defines structuring rules for the accountability concepts defined in 6.5. It uses the concepts defined in ITU-T Rec. X.902 | ISO/IEC 10746-2, in subclause 5.1 of ITU-T Rec. X.903 | ISO/IEC 10746-3 and in clause 6.

### 7.1 Overall structure of an enterprise specification

An enterprise specification of an ODP system is a description of that system and relevant parts of its environment. The enterprise specification focuses on the scope and purpose of that system and the policies that apply to it in the context of its environment.

NOTE 1 – The environment of an ODP system and the ODP system itself may span multiple organizations.

A fundamental structuring concept for enterprise specifications is that of community. A community is a configuration of enterprise objects that describes a collection of entities (e.g. human beings, information processing systems, resources of various kinds and collections of these) that is formed to meet an objective. These entities are subject to an agreement governing their collective behaviour. The assignment of actions to the enterprise objects that comprise a community is defined in terms of roles. (See 7.8.1 and 7.8.2.)