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Information technology — Open-edi reference model

Technologies de l'information — Modèle de référence EDI-ouvert

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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 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. 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 14662 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 30, *Open electronic data interchange*.

Annexes A to F of this International Standard are for information only.

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0 Introduction

The economic advantages of Electronic Data Interchange (EDI) are widely recognised. However, the cost of setting up an EDI relationship is still very high due to the need for a detailed bilateral business and technical agreement between the involved business partners. The initial high cost of establishing such an agreement does not justify short term partnerships. It has also been found that implementations involving the management of a large number of partners and their associated agreements are not productive. Consequently, most EDI implementations have been successful only:

- in long term partnerships;

- between a limited number of partners.

Open-edi lowers these barriers by introducing standard business scenarios and the necessary services to support them. Once a business scenario is agreed upon, and the implementations conform to the Open-edi standards, there is no need for prior agreement among trading partners, other than the decision to engage in the Open-edi transaction in compliance with the business scenario. Since Open-edi takes a generic approach, it enables organisations to establish short term relationships quickly and cost effectively. Business scenarios and the necessary supporting services will be available to all who wish to use them, thus providing the necessary means for implementing Open-edi.

The field of application of Open-edi is the electronic processing of business transactions among autonomous multiple organisations within and across sectors (e.g., public/private, industrial, geographic). It includes business transactions which involve multiple data types such as numbers, characters, images and sound.

The Open-edi Reference Model has been developed primarily in order to provide standards required for the inter-working of organisations, through interconnected information technology systems. This model is independent of specific:

- information technology implementations;

- business content or conventions;

- business activities;

- organisations.

The Open-edi Reference Model identifies the required standards for Open-edi and provides a reference for those standards by defining the basic concepts used to develop them. It serves as the basis for co-ordination of work between the different agencies involved in EDI standardisation. It provides the framework for this co-ordination and for the integration of existing and emerging standards and the development of future standards. The Open-edi Reference Model places existing EDI standards in perspective. Some of Open-edi standardisation areas and types of standardisation activities are presented in Annex A and some of the requirements for Open-edi standards in Annex B.

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The Open-edi Reference Model uses two views to describe the relevant aspects of business transactions:

- the Business Operational View (BOV);
- the Functional Service View (FSV).

The BOV, addresses the aspects of

a) the semantics of business data in business transactions and associated data interchanges;

b) the rules for business transactions, including:

- operational conventions;
- agreements;
- mutual obligations,

which apply to the business needs of Open-edi.

The FSV addresses the supporting services meeting the mechanistic needs of Open-edi.
It focuses on the Information Technology aspects of:

a) functional capabilities;

b) service interfaces;

c) protocols.

Such functional capabilities, services interfaces and protocols include:

- capability of initiating, operating and tracking the progress of Open-edi transactions;
- user application interface;
- transfer infrastructure interface;
- security mechanism handling;
- protocols for inter working of information technology systems of different organisations;
- translation mechanisms.

Figure 1 sets out the relationship between the model and these views.

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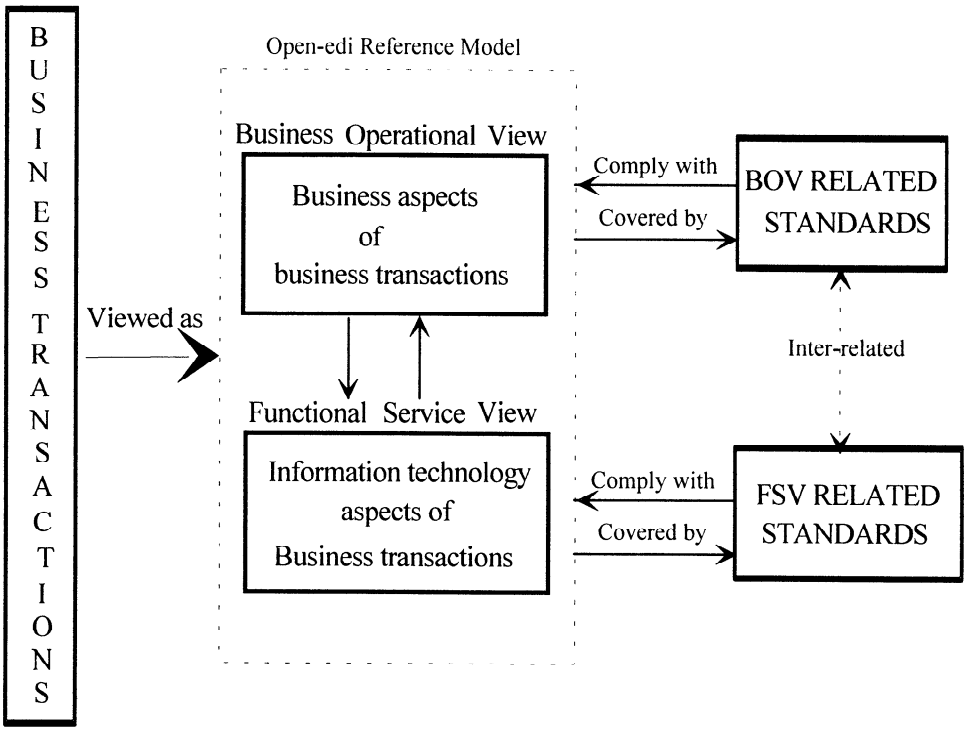

Figure 1 - Open-edi environment

0.1 The co-ordination needs of the Open-edi Reference Model

Standards required for Open-edi cover a large spectrum of areas including but not limited to:

- business aspects;
- support for national and international law and regulation;
- information technology generic standards, such as information modelling standards;
- software engineering standards;
- data modelling standards;
- information technology standards specific to one sector;
- interconnection standards, such as message handling, file transfer, transaction processing, network management;
- security standards.

Development of EDI standards is already taking place in several standardisation bodies and industry groups.

The co-ordination of standards development is essential in order to:

- avoid duplication of effort;
- ensure interoperability of standard conforming solutions;

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- ensure technical consistency of standards;

- identify and remedy deficiencies and voids in standards;

- identify and eliminate redundancies and overlaps in standards.

Annex A describes how the Open-edi Reference Model can serve as the basis for co-ordination of work of the different agencies involved in EDI standardisation.

0.2 The technical requirements of the Open-edi Reference Model

Each view of the Open-edi Reference Model corresponds to a class of necessary standards. One class of standards, associated with the BOV in the Open-edi Reference Model, addresses the business issues of Open-edi. Another class of standards, associated with the FSV in the Open-edi Reference Model addresses Information Technology (IT) issues. Each class of standards requires a specific type of expertise needed for their development. By separating the business user aspects of Open-edi from the IT aspects, the Open-edi Reference Model and its associated standards provide flexibility in accommodating changes in IT and user demands without impacting the Open-edi standards related to the business user aspects of Open-edi. Methods of implementing the standards which comply with this framework are not constrained by the model. Therefore inter working among Open-edi systems will be guaranteed while preserving flexibility in implementation.

The implementations of Open-edi will require the co-operation among different types of experts, primarily business users aided by information analysts and IT specialists including telecommunications experts.

In order to support an Open-edi activity, models must be developed which consider aspects of both the external and internal behaviour of organisations. The boundary between the external and internal behaviour will vary among organisations depending on how the implementation has been carried out. The models to be developed must consequently take into consideration those aspects which are necessary to ensure interoperability. Only the external behaviour of organisations affects the interoperability of Open-edi systems. The description of the internal behaviour of Open-edi systems is provided in the model only to support the definition and exposition of the interoperability aspects, and to offer insight to the definitions of the external interfaces required.

0.3 EDI and Open-edi: areas of activity and participation

The following tables illustrate the general context within which EDI activities take place. Table 1 presents the areas of activity; Table 2, the types of bodies which should fulfil those areas of activity; Table 3 identifies typical actors at the time of this International Standard. It is expected that working documents will be created identifying all relevant sectorial actors.

The application of the Open-edi reference model specified in this International Standard enables the evolution of the organisation of the activities detailed in Table 1. That evolution is found in Annex A, and in particular in Tables A.1 and A.2.

Table headings are explained in Annex A. Tables 1, 2 and 3 have, in addition, a new dimension, below that of Environment, which is characterised as "Formal Recognition". This is a specific stage between Environment, which is understood to be the existence of all that there is in the development of standard frameworks, and Activity Models, which are understood to be business modelling methods and techniques identified by the frameworks.

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Table 1 - Areas of activity

	Meta-standards A	Standards B	Guidance C	Produce product D	Conformance & certification E	Take into use by F
1. Environment	Languages	Laws, Practices	Business Guidelines		Courts, Tribunals	Contracts
2. Formal recognition	Frameworks	Reference Models	BOV & FSV		Testing Bodies	Toolsets
3. BOV activity models	Modelling Languages	Business Scenarios	Conventions		Test Definitions	Applications
4. BOV data models	Modelling Languages	Message Standards	Usage Guidelines		Test Definitions	Actual data
5. FSV technology	Tools, Techniques	Inter-operability Standards	Profiles		Inter-operability Standards	Software, Hardware

Table 2 - Types of bodies that should be involved in performing the different tasks for each cell

	Meta-standards A	Standards B	Guidance C	Produce product D	Conformance & certification E	Take into use by F
1. Environment	LEGAL and	REGULATORY BODIES	FRAMEWORK	IMPLEMEN-TORS and USERS	TESTING and CERTIFICATION BODIES	IMPLEMEN-TORS and USERS
2. Formal recognition	STANDARDISATION	PROCESS	BODIES			
3. BOV activity models						
4. BOV data models						
5. FSV technology						

Table 3 - Current participants

	Meta-standards	Standards	Guidance	Produce product	Conformance & certification	Used by
Environment	Languages	International National Bilateral			Courts	
Formal recognition	ISO/IEC JTC 1/SC 30	National standards bodies UN/ECE ISO/IEC	ISO/IEC JTC1 SC 30		ISO/IEC	Standards bodies Suppliers Users
BOV activity models	ISO/IEC JTC 1/SC 7 and SC 30 ISO TC 184	ISO and IEC sectorial bodies National standards bodies		non-standard products		Users
BOV data models	ISO/IEC JTC 1/SC 14, SC 21/WG 3 and SC 30	Trade bodies User groups UN/ECE	as previous column plus sectorial groups EWOS	Suppliers	UN/ECE/WP.4/ GE.1	Users
FSV technology	ISO/IEC JTC 1	ISO/IEC JTC 1	ISO/IEC JTC 1/SC 30	Manufacturers Suppliers	Many	Users

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Information technology — Open-edi reference model

1 Scope

This International Standard specifies the framework for co-ordinating the integration of existing standards and the development of future standards for the inter-working of organisations via Open-edi and provides a reference for those standards. As such it serves to guide the standards work necessary to accomplish Open-edi by providing the context to be used by developers of standards to ensure the coherence and integration of related standardised modelling and descriptive techniques, services, service interfaces, and protocols.

This International Standard describes, through two perspectives of business transactions, significant aspects relevant to the interoperability of information technology systems used by organisations engaging in Open-edi. The perspectives are:

a) business aspects such as business information, business conventions, agreements and rules among organisations;

b) information technology aspects which are necessary in the Open-edi systems to support the execution of business transactions.

This International Standard is not an implementation specification nor is it a basis for appraising the conformance of implementations.

2 Normative reference

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

ISO 6523: 1984, *Data interchange - Structure for the identification of organizations.*

3 Technical normative elements

3.1 Definitions

For the purposes of this International Standard, the following definitions apply:

3.1.1 Application Program Interface (API): a boundary across which application software uses facilities of programming languages to invoke services. [JTC1 directives]

3.1.2 business: a series of processes, each having a clearly understood purpose, involving more than one organisation, realised through the exchange of information and directed towards some mutually agreed upon goal, extending over a period of time.

3.1.3 Business Operational View (BOV): a perspective of business transactions limited to those aspects regarding the making of business decisions and commitments among organisations, which are needed for the description of a business transaction.

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3.1.4 business transaction: a predefined set of activities and/or processes of organisations which is initiated by an organisation to accomplish an explicitly shared business goal and terminated upon recognition of one of the agreed conclusions by all the involved organisations although some of the recognition may be implicit.

3.1.5 Electronic Data Interchange (EDI): the automated exchange of any predefined and structured data for business purposes among information systems of two or more organisations.

3.1.6 Formal Description Technique (FDT): a specification method based on a description language using rigorous and unambiguous rules both with respect to developing expressions in the language (formal syntax) and interpreting the meaning of these expressions (formal semantics). [JTC1 directives]

3.1.7 Functional Service View (FSV): a perspective of business transactions limited to those information technology interoperability aspects of IT Systems needed to support the execution of Open-edi transactions.

3.1.8 Information Technology System (IT System): a set of one or more computers, associated software, peripherals, terminals, human operations, physical processes, information transfer means, that form an autonomous whole, capable of performing information processing and/or information transfer.

3.1.9 Open-edi: electronic data interchange among multiple autonomous organisations to accomplish an explicit shared business goal according to Open-edi standards.

3.1.10 Open-edi Standard: a standard that complies with the Open-edi Reference Model

3.1.11 Open-edi Party (OeP): an organisation that participates in Open-edi.

3.1.12 Open-edi scenario: a formal specification of a class of business transactions having the same business goal.

3.1.13 Open-edi transaction: a business transaction that is in compliance with an Open-edi scenario.

3.1.14 organisation: unique framework of authority within which a person or persons act, or are designated to act, toward some purpose. [ISO 6523]

3.2 Symbols and abbreviations

API	Application Program Interface
BIM	Business and Information Modelling
BOV	Business Operational View
CASE	Computer Aided Software Engineering
DMA	Decision Making Application
EDI	Electronic Data Interchange
EDIFACT	EDI For Administration, Commerce and Transport
EWOS	European Workshop for Open Systems
FDT	Formal Description Technique
FSV	Functional Service View
GE	Group of Experts
IB	Information Bundle

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IPD	Information Processing Domain
IT	Information Technology
MHEG	Multimedia Hypermedia Expert Group
OeCI	Open-edi Control Information
OeDT	Open-edi Descriptive Technique
OeP	Open-edi Party
OeSE	Open-edi Support Entity
OeUD	Open-edi User Data
OSI	Open System Interconnection
SC	Semantic Component (in the context of Open-edi scenarios)
SC	Sub-Committee (in the context of ISO or IEC)
SGML	Standard Generalised Mark-up Language
STEP	STandard for the Exchange of Product model data
TC	Technical Committee
TDID	Trade Data Interchange Directory
TI	Transfer Infrastructure
UN/ECE	United Nations / Economic Commission for Europe
UNSM	United Nations Standard Message
WG	Working Group
WP	Working Party

4 The Open-edi Reference Model

The Open-edi Reference Model provides a reference framework for the identification, development, and co-ordination of Open-edi standards. This framework addresses two perspectives of business transactions. One, the BOV, captures the business users aspects, the other, the FSV, captures the information technology aspects. A class of standards is associated with each view. They are respectively called the BOV related standards and the FSV related standards.

These perspectives are defined as follows:

- **Business Operational View (BOV)**: a perspective of business transactions limited to those aspects regarding the making of business decisions and commitments among organisations, which are needed for the description of a business transaction;

- **Functional Service View (FSV)**: a perspective of business transactions limited to those information technology interoperability aspects of IT Systems needed to support the execution of Open-edi transactions.

The BOV related standards are tools and rules by which users, who understand the operating aspects of a business domain, may create scenarios. Registration authorities will reference the BOV related standards when considering scenarios for registration.

If those Open-edi scenarios are standardised they are called standardised Open-edi scenarios and are not "BOV related standards".

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The FSV related standards are used by the information technology experts. The information technology experts are those within an organisation who use this technology to design and/or build IT systems which support the business needs. These experts produce products and services conforming to FSV related standards (Open-edi systems) which can potentially support the execution of Open-edi transactions.

As shown in figure 2, the effective inter-relationship between these two classes of standards is a critical factor of the Open-edi reference model. The FSV related standards shall take into account the BOV related standards and vice-versa. Open-edi scenarios, built using BOV related standards, formulate requirements which are demands placed on the IT product and services conforming to FSV related standards executing the corresponding Open-edi transaction. These demands include:

- identification of functional capabilities necessary to support Open-edi transactions;

- the quality of service required from the functional capabilities for these Open-edi transactions.

Formal specification(s) of the functional components needed to support Open-edi transactions, through IT Systems, are developed using FSV related standards.

The intention is that, once an Open-edi scenario is agreed upon, if implementations conform to the FSV related standards, there is no need for prior agreement between the organisations, other than the agreement to engage in the Open-edi transaction in compliance with the Open-edi scenario. The intention is that the sending, by an Open-edi party, of information from a scenario, conforming to Open-edi standards, shall allow the acceptance and processing of that information in the context of that scenario by one or more Open-edi parties by reference to the scenario and without the need for agreement. However, the legal requirements and/or liabilities resulting from the engagement of an organisation in any Open-edi transaction may be conditioned by the competent legal environment(s) or the formation of a legal interchange agreement between the participating organisations. Open-edi parties need to observe rule-based behaviour and possess the ability to make commitments in Open-edi (e.g., business, operational, technical, legal and/or audit perspectives).

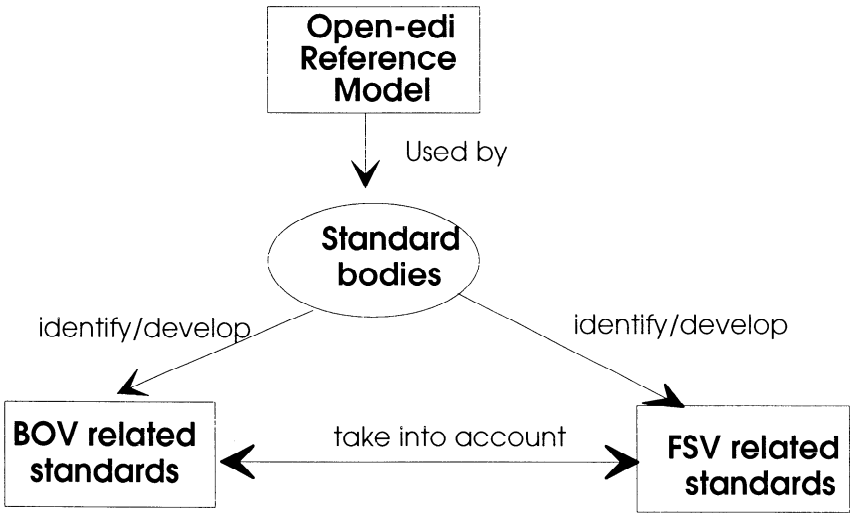

Figure 2 - The creation of BOV and FSV standards

4.1 Business operational view

The BOV addresses the business requirements for inter-working among Open-edi Parties, as well as demands on supporting IT products and services. These business requirements include business conventions, agreements and rules among organisations.

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4.1.1 BOV related standards

BOV related standards provide the tools for formal business description(s) of the external behaviour of organisations, as seen by other organisations, in view of achieving a business goal. As such, the BOV related standards provide a means for capturing the static and dynamic requirements of business.

The BOV related standards provide a specification of how to model the business and associated requirements as an Open-edi scenario. This specification includes the modelling standard containing the Open-edi Description Technique to be used.

Open-edi Description Technique (OeDT): a specification method such as a Formal Description Technique, another methodology having the characteristics of a Formal Description Technique, or a combination of such techniques as needed to formally specify BOV concepts, in a computer processible form.

The BOV related standards provide the tools and rules to permit and ensure:

- the specification of an Open-edi scenario;

- the reusability of components of Open-edi scenario;

- the harmonisation of components of Open-edi scenario among user communities.

4.1.2 Open-edi scenarios

Different user groups will generate Open-edi scenarios in accordance with the specification given in the BOV related standards. Open-edi scenarios shall be specified in conformity to the BOV related standards. Business communities can propose Open-edi scenarios as candidates for standardisation and registration into (an) Open-edi scenario repository (ies). Procedures to be used for introducing new Open-edi scenarios and updating Open-edi scenarios in one or more repositories are specified in a BOV related standard.

Parties will have a need for both generic and specific scenarios. Generic scenarios set out the overall scenario structure for a business transaction; however, these are realised through profiles for specific scenarios which support particular sectorial, legislative and other requirements.

All the specifications included in an Open-edi scenario are made at an abstract level. This is independent of matters such as data representation, coding, encoding.

The OeDT to be used for these scenarios shall therefore allow for both hierarchical decomposition and a modular approach.

Therefore, BOV related standards shall provide for the possibility of defining Open-edi scenarios with different levels of granularity.

Open-edi scenarios include the following components:

- roles;

- information bundle(s);

- scenario attribute(s).

4.1.2.1 Roles

role: a specification which models an external intended behaviour (as allowed within a scenario) of an Open-edi Party.

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