PD ISO/IEC/TR 29166:2012

Information technology — Document description and processing languages — Guidelines for translation between ISO/IEC 26300 and ISO/IEC 29500 document formats

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National foreword

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TECHNICAL REPORT

ISO/IEC TR 29166

First edition
2011-12-15

Information technology — Document description and processing languages — Guidelines for translation between ISO/IEC 26300 and ISO/IEC 29500 document formats

Technologies de l'information — Description des documents et langages de traitement — Lignes directrices pour la traduction des formats de document ISO/CEI 26300 et ISO/CEI 29500

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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.

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

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.

In exceptional circumstances, when the joint technical committee has collected data of a different kind from that which is normally published as an International Standard (“state of the art”, for example), it may decide to publish a Technical Report. A Technical Report is entirely informative in nature and shall be subject to review every five years in the same manner as an International Standard.

Attention is drawn to the possibility that some of the elements of this document 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 TR 29166 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 34, *Document description and processing languages*.

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Introduction

OASIS Open Document Format ODF 1.0 (ISO/IEC 26300) and Office Open XML (ISO/IEC 29500) are both open document formats for saving and exchanging word processing documents, spreadsheets and presentations. Both formats are XML based but differ in design and scope.

OASIS ODF 1.0 was published by OASIS as an *OASIS standard* in May 2005. The second edition of ODF 1.0 has been published by OASIS as a *committee specification* in July 2006 and accepted as an International Standard by ISO (ISO/IEC 26300) in December 2006. Office Open XML was first approved in December 2006 by the ECMA International General Assembly as ECMA-376. An updated version was published in November 2008 by ISO (ISO/IEC 29500). The corresponding version, ECMA-376 2nd edition, was published in December 2008.

This Technical Report addresses both developers seeking to implement either the OpenDocument or the Office Open XML International Standard and template designers and other power users whose competences cut across the spectrum of XML and XML-related technologies which directly or remotely deal with one or both of the two International Standards. This Technical Report will be of great assistance to those seeking to exchange documents between formats, to extract data from or import data into documents, or to write applications supporting the two formats.

This Technical Report aims at analysing the two International Standards and their underlying concepts in terms of interoperability issues for a selected set of features. It analyses the way these features are implemented in both International Standards and estimates the degree of translatability between them using a table-based comparison. This Technical Report serves as a preliminary technical translation guideline for evaluating translatability between certain parts of the two International Standards. It does not compare different implementations which can cause additional kinds of interoperability problems.

Both Office Open XML and OpenDocument formats are basically descriptions of schemas used for word processing documents, spreadsheets and presentations created by office application suites. Both are open formats. A key design objective is to guarantee long-term access to data without the legal or technical barriers associated with proprietary binary formats. XML schema definitions are normative parts of both International Standards.

Manipulating documents is fundamentally facilitated by separating a document's layout from its content. Editing the layout and data components independently of one another affords considerable flexibility in creating and editing office documents. Defining the structure and content of documents has been the focus of both International Standards. A document's layout is ultimately governed by the implementation of the office suite, in particular by the rendering engine. Thus, as depicted in Figure 1, using exactly the same standard to describe a document does not guarantee that different office suites will produce identical layouts. Consequently, this Technical Report focuses more on the definition of guidelines for the translation of document structure, content and presentation instructions than on the preservation of document layout.

In this Technical Report the two International Standards will be examined in their universality and not by comparing specific implementations such as Microsoft Office or OpenOffice.org/LibreOffice. For this reason, various examples have been developed using a simple XML editor which supports both standards. The names of specific implementations may be used in the use cases to illustrate the real world scenario behind the use case. The figures in this Technical Report are created for illustration purposes, using available tools such as OpenOffice 3.* and Microsoft Office 2010. It should not be assumed that the current versions of these implementations support all the features needed to implement the use case, especially the document standards and the translation between them.

Several use cases do not mention existing tools, but rather use abstract names such as document format A (DF-A) and document format B (DF-B).

This Technical Report begins with a presentation of typical use cases characterizing scenarios where specific features supported by both document formats are used. It then analyses the most important features of one

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document format and shows how those features can best be represented in the other format. It then reviews the concepts and various features of the two document formats in order to provide a good understanding of the formats' common features and especially their differences. Most features can be translated to the other format with varying degrees of fidelity. For the most important features, this Technical Report provides detailed information on the implementation of the feature and the extents to which that feature can be translated, including typical translation rules. Finally, an overview summing up the most important results and deriving guidelines for the translation between both formats concludes this Technical Report.

The following abbreviations are used throughout this Technical Report:

- *ODF*, which stands for OpenDocument Format (ISO/IEC 26300:2006);
- *OOXML*, which stands for Office Open XML (ISO/IEC 29500:2008).

It is hoped that this Technical Report will be useful in understanding how the ODF and OOXML International Standards compare and how their functionality can be mapped between the two formats. It is a necessary step to the goal of helping achieve interoperability and harmonization between the two formats.

History of ODF and OOXML

ODF was originally developed by Sun Microsystems between 2000 and 2002 with the following objective:

"To create as a community, the leading international office suite that will run on all major platforms and provide access to all functionality and data through open-component based APIs and an XML-based file format." [1]

In 2002, the standardization process was initiated at OASIS, and in 2005 the standard was published as *OASIS Open Document Format for Office Applications*, abbreviated as *OpenDocument* or *ODF.* In 2006, *Open Document Format for Office Applications v.1.0* became an ISO International Standard (ISO/IEC 26300). *Open Document Format for Office Applications v.1.1* has been published by OASIS as an *OASIS standard* in February 2007. At the time of writing (June 2011) Version 1.2 has been released as a Committee Specification 1.0. While version 1.0 of the ODF standard only consists of one part, the current version is structured into three parts: core, formulas, and packages.

Microsoft followed suit in 2006 via the *Open Specification Promise* (OSP[2]) by opening the format of its 2007 version of the Microsoft office suite (version 12) for which it also uses XML as an exchange and storage format. OOXML is a file format originally developed by Microsoft as a successor to its earlier Office 2003 file formats. It is used for representing spreadsheet, presentation and word processing documents. In 2006 Office Open XML became an ECMA standard (ECMA-376, 1st edition). In 2008, a revised version of ECMA-376 became an ISO International Standard (ISO/IEC 29500:2008), which has its equivalent in the ECMA-376, 2nd edition.

ISO/IEC 29500 is structured into four parts, each of which contains normative as well as informative material: Fundamentals and Markup Language Reference, Open Packaging Conventions, Markup Compatibility and Extensibility, and Transitional Migration Features.

At the time of writing (June 2011) the following corrigenda and amendments have been published:

- ISO/IEC 29500-1:2008/Cor.1:2010, ISO/IEC 29500-2:2008/Cor.1:2010, ISO/IEC 29500-3:2008/Cor.1:2010 and ISO/IEC 29500-4:2008/Cor.1:2010, containing minor technical corrections and editorial modifications;
- ISO/IEC 29500-1:2008/Amd.1:2010 and ISO/IEC 29500-4:2008/Amd.1:2010, containing namespace changes and modifications concerning the usage of percentage (%) values;

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1 http://www.openoffice.org/about_us/ooo_release.html

2 http://www.microsoft.com/interop/osp/default.mspx

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- ISO/IEC 29500:2011 (ECMA 376 3rd edition) as a consolidated version of OOXML containing the above-mentioned corrigenda and amendments;
- ISO/IEC 26300:2006/Cor.1:2010, containing editorial modifications;
- ISO/IEC 26300:2006/Cor.2:2011, fixing editorial errors.

In addition, the following Amendments are under preparation:

- Amendment 1 to ISO/IEC 29500-1:2011 and Amendment 1 to ISO/IEC 29500-4:2011 about ISO 8601 dates;
- Amendment 1 to ISO/IEC 26300:2006 introducing ODF 1.1.

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Information technology — Document description and processing languages — Guidelines for translation between ISO/IEC 26300 and ISO/IEC 29500 document formats

1 Scope

This Technical Report provides guidelines for translation between ISO/IEC 26300 and ISO/IEC 29500 document formats. It starts by studying common use cases to identify how the most important functionalities of one document format can be represented in the other format. This is followed by a thorough review of the concepts, architectures and various features of the two document formats in order to provide a good understanding of the commonalities and differences. It is expected that functionalities will be able to be translated with different degrees of fidelity to the other format. As an illustrative sample of this functionality, detailed information is provided on the extent to which those functionalities can be translated. This Technical Report is a necessary step to the goal of helping achieve interoperability and harmonization between the two formats.

2 Normative references

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

ISO/IEC 26300:2006, *Information technology — Open Document Format for Office Applications (OpenDocument) v1.0*

ISO/IEC 29500-1:2008, *Information technology — Document description and processing languages — Office Open XML File Formats — Part 1: Fundamentals and Markup Language Reference*

ISO/IEC 29500-2:2008, *Information technology — Document description and processing languages — Office Open XML File Formats — Part 2: Open Packaging Conventions*

ISO/IEC 29500-3:2008, *Information technology — Document description and processing languages — Office Open XML File Formats — Part 3: Markup Compatibility and Extensibility*

ISO/IEC 29500-4:2008, *Information technology — Document description and processing languages — Office Open XML File Formats — Part 4: Transitional Migration Features*

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3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
translation type
methods used when translating between ODF and OOXML documents

NOTE This Technical Report distinguishes four *translation types*:

- one way ODF to OOXML translation;
- one way OOXML to ODF translation;
- round trip ODF to OOXML to ODF translation;
- round trip OOXML to ODF to OOXML translation.

3.2
translation fidelity
quality of a translation process between the ODF and OOXML *document formats*

NOTE 1 *Translation fidelity* depends on *document properties*.

NOTE 2 *Translation fidelity* cannot be measured in an absolute manner; it depends on the intentions of the document's authors.

3.3
document type
characterization of the specific purpose and content of a document

NOTE 1 This Technical Report distinguishes three major *document types*: word processing, spreadsheet and presentation documents.

NOTE 2 Some *document features* only exist in one *document type*; other *features* have been defined for more than one *document type*.

NOTE 3 The association between *document type* and *document feature* can be different for ODF and OOXML.

3.4
document property
description of different yet independent dimensions within the specification of a document

NOTE 1 As defined in 4.2 this Technical Report distinguishes the following *document properties*:

- presentation instructions;
- content;
- dynamic content;
- meta data;
- annotations and security;
- document parts.

NOTE 2 *Document properties* are implemented using *document features*.

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3.5
document feature
characterization of a document used to implement specific aspects of a *document property*

NOTE 1 *Document features* are visible to a user.

NOTE 2 *Document features* are illustrated by associated use cases in this Technical Report.

NOTE 3 The terms *feature*, *functionality* and *sub functionality* are used to structure the comparison of both *document formats* in Clause 6.

NOTE 4 *Document features* implement *document properties*.

3.6
document format
synonym for *document standard* within this Technical Report

3.7
functionality
refinement of *document features*

NOTE 1 For example, the format of a paragraph is a *feature* and the height of a line is a *functionality*.

NOTE 2 In many cases *functionality* is implemented using XML types or elements.

3.8
sub functionality
itemization of *functionality*

NOTE 1 For example, the height of a line can be defined as fixed, font-independent, automatic, etc.

NOTE 2 In many cases *sub functionality* is implemented using XML attributes.

3.9
translatability level
rough scale for translation fidelity

NOTE 1 Translatability *levels* are used in Clause 6.

NOTE 2 *Translatability levels* have a three tier range (low, medium, high).

3.10
translation complexity
description of the complexity of the translation process for *document features*, considering their structures and associated translation rules

NOTE 1 *Translation complexity* is a three value metric system (easy, moderate, difficult).

NOTE 2 *Translation complexity* is used in Clause 8 to classify the translation of *document features* or *functionalities* from one format to the other.

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4 Basic principles

4.1 Structure of the report

The report is structured according to the viewpoints introduced in the reference model for Open Distributed Processing ODP (ISO/IEC 10746). Refer to ISO/IEC 10746-1:1998 and ISO/IEC 10746-3:1996.

4.1.1 Enterprise view

The enterprise viewpoint is concerned with the purpose, scope and policies governing the activities of the specified system within the organization of which it is a part. All requirements that are relevant to defining the architecture and properties of the system are gathered in this viewpoint.

In clause 5 the TR describes the translation process from the enterprise viewpoint. It focuses on use cases that describe how a document is used in a specific scenario. Features and functionalities of documents like presentation instructions, structural information, application context, and the content itself as well as certain conformance classes based on translation types and properties have been taken into consideration. Users of document standards and decision makers are the intended readers of this section.

4.1.1.1 Use case template

To facilitate comparisons and a quick overview, use cases are described using the following template:

Textual description:

- *Describe the scenario/story the use case is going to tell;*
- *Include one or more figures demonstrating the use case (optional);*
- *Define the translation type and fidelity to be demonstrated.*

Implementation:

- *Describe the features necessary to implement the use case.*

Use case[3] name: **Translation type and properties:**	
One-trip translation	ODF → OOXML or/and OOXML → ODF
Round trip translation	ODF→OOXML→ODF or/and OOXML→ODF→OOXML
Presentation instructions	✓
Document content	✓
Dynamic content	✓
Metadata	✓
Annotations and security	✓
Document parts	✓

[3] For details about the use case table please refer to section 4.2.

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Additional properties	...
Required features: • *Feature a including references to standards* • *Feature b including references to standards*	

Requirements:

- *Describe the expected behaviour of a feature's translation between both International Standards;*
- *Describe how the document(s) used in the use case should be defined to achieve the intended fidelity.*

Conclusion:

- *Compare the applicable features in both International Standards and the translation rules and fidelity as elaborated on in clauses* 6 *and* 8.

4.1.2 Computational view

The computational viewpoint is concerned with the functional decomposition of a system into a set of objects that interact at interfaces: thus enabling system distribution.

In clause 6 the TR describes the translation process from the computational viewpoint. It focuses on the features and functionalities of a document. The *what* is described, independent of *how* the feature is implemented in the particular standard. Power users and developers are the intended readers of this section.

4.1.3 Information view

The information viewpoint is concerned with the kinds of information handled by a system and constraints on the use and interpretation of that information. An information specification of a system defines the semantics of information and the semantics of information processing.

In clause 7 the TR describes the translation process from the information viewpoint. It is focusing on *how* the functionality and features of a document are implemented in the standards. The document structure and its XML markup are described. Power users, developers and persons responsible for the maintenance of the standards are the intended readers of this section.

4.1.4 Engineering view

The engineering viewpoint is concerned with the infrastructure required to support system distribution. An engineering specification defines the mechanisms and functions required to support distributed interaction between objects.

In clause 8 the TR describes the translation process from the engineering viewpoint. It focuses on how the features and structures are translated and preserved in the translation process. Developers and persons responsible for the maintenance of the International Standards are the intended readers of this section.

4.1.5 Technical view

The technology viewpoint is concerned with the choice of technology used to support system distribution.

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In clause 9 the TR describes the translation process from the technical viewpoint. It focuses on available resources and tools for creating, editing and translating documents. All groups mentioned above are the intended readers of this section.

4.2 Approach

This TR takes a use case based approach to identify the requirements needed for translating between ODF and OOXML. As depicted in Figure 2, use cases are selected and categorized along two lines: *type of translation* and *document properties* defining the fidelity of a translation. This approach covers all aspects of translations between the two document formats. Both International Standards define a storage and exchange format for documents, including information about both a document's presentation and its content. The process of document rendering or laying out is beyond the scope of the actual standards, and thus beyond the scope of both the translation process and this report.

Graphic fidelity between different rendering engines (i.e. layout implementations), another important category of uses cases, is also beyond the scope of this report. In such use cases, different rendering engines are provided with the same information, but may produce visually different results. Since the actual layout process is not described by either the ODF or the OOXML International Standard, this report does not deal with such use cases. However, it does cover preservation of layout information and presentation instructions around format translations so that the *selfsame* rendering engine can produce the same visual result from the same information encoded in different formats as depicted in Figure 1. Nevertheless, from a user's point of view in many use cases the graphical appearance of a document will be the major criterion for the evaluation of the fidelity of a transformation process. Therefore the graphical appearance of the documents depicted in Figure 1 should be independent of the chosen path.

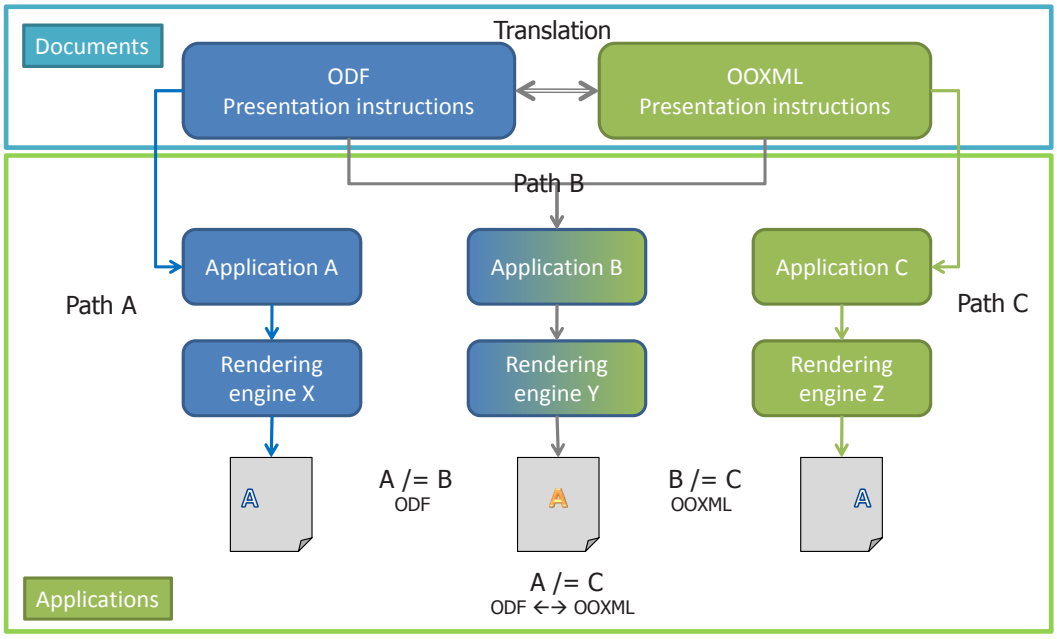

Figure 1 — Translation of presentation instructions

Use case descriptions reference subclause 4.2 for the description of demonstrated translation types and fidelities and clause 6 for a comparison of required features and functionalities.

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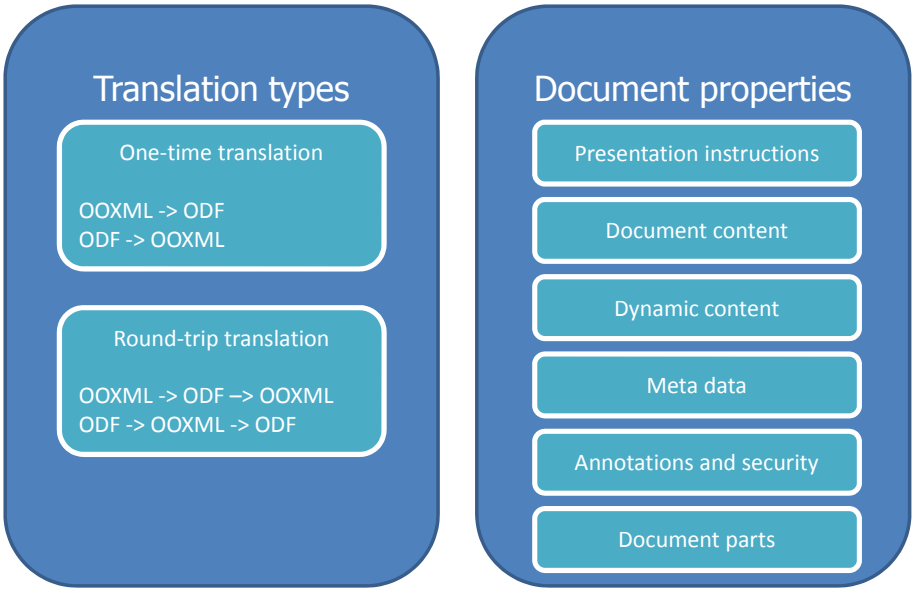

Figure 2 — Use case category overview

Translation fidelity of a document depends on the following document properties:

- *Presentation instructions* include all layout and presentation related information such as fonts, spacing, margins, colours, paper layout and settings, and animation in office documents.
- *Document content* covers all properties of content (such as text, graphics and formulas) defined directly by the author of a document.
- *Dynamic content* covers all aspects of automatically generated content including calculations or form functionalities such as fields, generated tables or dynamic references.
- *Metadata* cover all information apart from the core document content. Metadata are used to describe meta information about the document such as the generator, version, authors and to ensure the accessibility of documents, for instance by using certificates.
- *Annotation and security* covers all aspects of annotations used in a document including comments, change tracking, collaborative functions and security features such as encryption and access control.
- *Document parts* cover all aspects (editing semantics) of structural document properties such as paragraphs, headings, headers, footers, tables, lists, footnotes, indices and captions.

Some use cases focus on a one way translation process from standard A to standard B; a typical scenario is where the author of a document uses a tool that supports a different standard than the tool used by the reader. In the case that different authors of a document are using tools supporting different standards a round trip translation process has to be supported. The requirements for such processes are much higher than for one-way translations because mutual mappings between the International Standards have to be possible.

The report introduces the concept of *use cases* to demonstrate document *features*. As depicted in Figure 3, these features are used to implement the document *properties* described above. Each feature is refined by *functionalities* and *sub functionalities*. The use cases, together with their required document features, are introduced in clause 5. Features, functionalities and sub functionalities are described and compared in clause 6.

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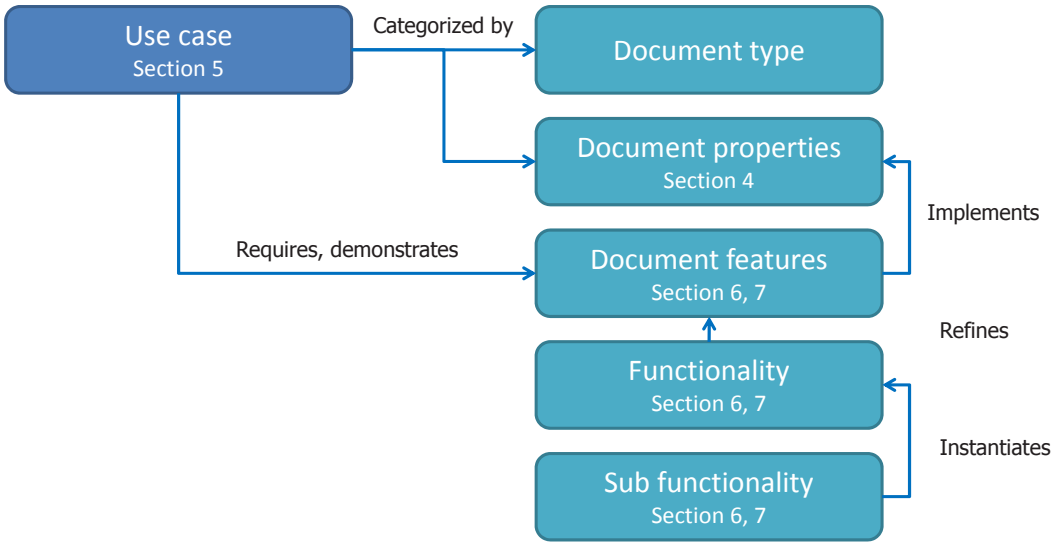

Figure 3 — Relation between functionality and document properties and features

A detailed description of the XML representations of selected document features used in the use cases is given in clause 7. These descriptions show how similar features are implemented in specific ways in both document formats. In some cases a feature is implemented using comparable and easy translatable structures, in some cases a feature has to be implemented by a combination of corresponding features in the other document format and in some cases a feature is only available in one of the two formats. Clause 8 concludes the analysis of specific XML representations and introduces examples of characteristic translation algorithms covering the whole translation spectrum. It gives examples for high visual fidelity as well as for high structural fidelity. Guidelines for end users telling what can be done and what should be avoided during the joint preparation of a document will be derived from this variety of translation fidelities.

5 Use cases

5.1 Introduction

This TR takes a use case based approach in order to identify the necessary requirements for translating between ODF and OOXML documents. It describes the translation process from the ODP enterprise viewpoint when utilizing use cases and states how a document should be used in a specific scenario. The expected and observable behaviour of a translation process is described here, as based on the translation types and documents properties explained above. The comparison of both behavioural types is then used to measure the fidelity of this translation process.

The TR defines use cases for each of the three major document types and for documents consisting of mutual included document types.

5.2 Word processing documents

5.2.1 Empty document

Textual description:

When a new document is created either in ODF format or in OOXML format, the user initially sees an empty document. When the document is saved without any further editing, it is generated without user content but it contains some initial metadata and presentation instructions. This initial content should be preserved as much as possible during the translation process.

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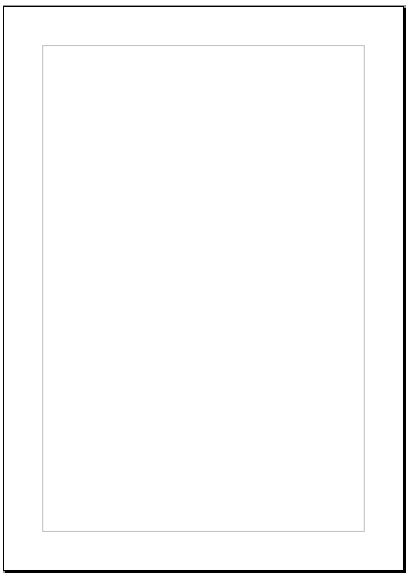

Figure 4 — Empty word processing document

Implementation:

The term *empty document* is not defined in both International Standards. Each application has its own initial metadata and presentation instructions. For example, an empty document has a default section, a default paragraph and a default definition of a page layout without user defined content.

Use case name: Empty wordprocessing document **Translation type and properties:**	
One-trip translation	✓
Round trip translation	✓
Presentation instructions	✓
Document content	
Dynamic content	
Metadata	✓
Annotations and security	
Document parts	

Required features:
• Metadata
  ○ OOXML: Subclause 8.3; 17.*
  ○ ODF: Subclause 3.1	

Requirements:

The following behaviour should be maintained no matter which standard is used:

- Presentation and style instructions remain unchanged;
- Metadata remain unchanged.

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It is not necessarily expected that both International Standards will use similar defaults for metadata.

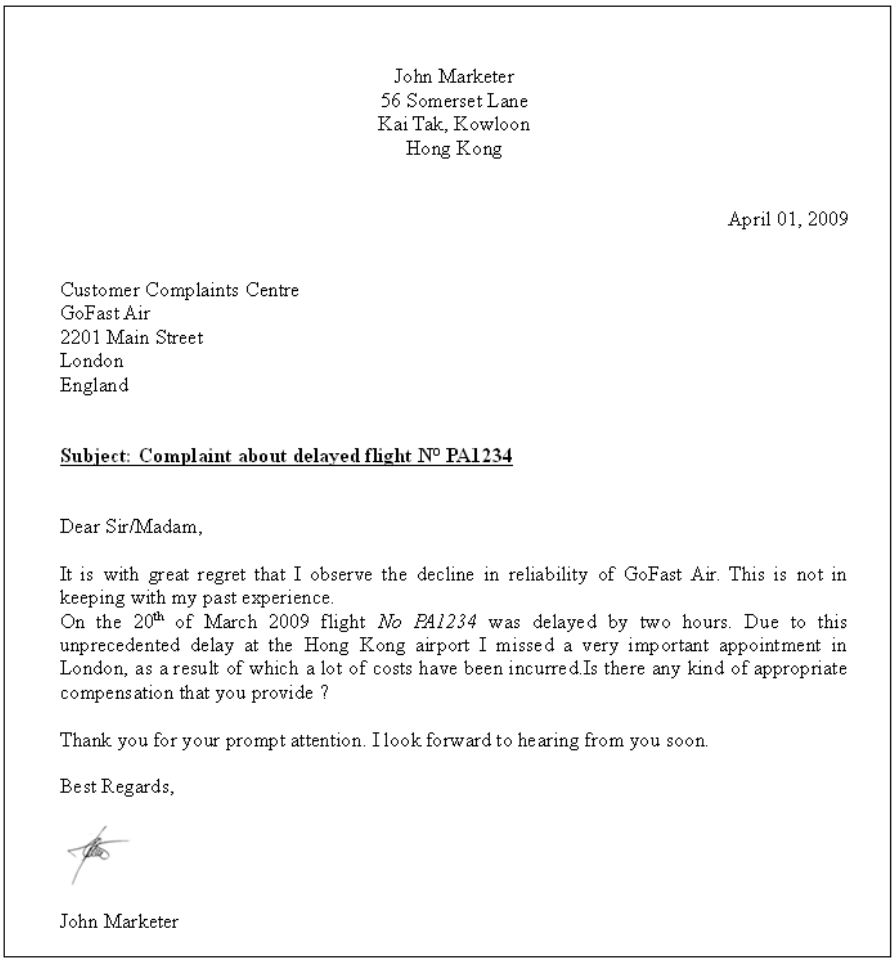
Conclusion:

Neither ODF nor OOXML can precisely define the term *empty document*. Thus the content of an empty document depends more on the application used to create it than on the standard. When an empty document defined in format A is opened in format B, presentation instructions can be preserved. However, the initial view of the empty document may be slightly different, depending on the rendering engine. Metadata can be translated accordingly, even though some information like the application creating the document may be modified.

5.2.2 Simple text and paragraph formatting

Textual description:

This use case describes the issue of a business letter and its translation between the International Standards ODF and OOXML with a special focus on formal aspects. The scenario starts with user John who has decided to file a complaint to his preferred airline about a delayed flight which caused some trouble to his agenda. John works on his private laptop using format A and starts to write the letter which looks like the one depicted in Figure 5. After finishing the letter, John emails it to his secretary Mary. Mary imports the document to a tool using format B to check visual appearance and spelling. Then she emails it to the customer complaints centre (CCC) of GoFast Air in London. The receiving agent in the CCC in London works again with format A.



John Marketer
56 Somerset Lane
Kai Tak, Kowloon
Hong Kong

April 01, 2009

Customer Complaints Centre
GoFast Air
2201 Main Street
London
England

Subject: Complaint about delayed flight Nº PA1234

Dear Sir/Madam,

It is with great regret that I observe the decline in reliability of GoFast Air. This is not in keeping with my past experience.
On the 20th of March 2009 flight *No PA1234* was delayed by two hours. Due to this unprecedented delay at the Hong Kong airport I missed a very important appointment in London, as a result of which a lot of costs have been incurred.Is there any kind of appropriate compensation that you provide ?

Thank you for your prompt attention. I look forward to hearing from you soon.

Best Regards,

John Marketer

Figure 5 — Sample letter

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Implementation:

This sample letter makes use of all typical text formatting features. There is centred text on the top and the date information is positioned on the right. The receiver's address is aligned on the left. The letter's body paragraph is justified. The letter contains a bold paragraph as the subject line as an example of *paragraph formatting*. Embedded italic characters in the body text are used as an example of the *text formatting* feature that allows specific attributes for parts of a paragraph to be defined. An image representing the signature of the author is embedded at the end of this document. Presentation instructions, content and parts of the document must be preserved during translation.

Use case name: Simple text formatting **Translation type and properties:**	
One-trip translation	✓
Round trip translation	✓
Presentation instructions	✓
Document content	✓
Dynamic content	
Metadata	
Annotations and security	
Document parts	✓

Required features:
• Text formatting
  ○ OOXML: Sublause 8.3, 17.*
  ○ ODF: Subclause 2.3, 4, 9.5, 14.*, 15.4
• Paragraph formatting
  ○ OOXML: Subclause15.2, 17.*
  ○ ODF: Subclause 2.8, 4.2, 9.3, 7.12, 14.*, 15.*	

Requirements:

This scenario requires the preservation of presentation instructions during multiple translations of a formal business document. A formal business letter is a common example of the application of basic text processing functionality. A formal letter should strictly conform to a set of guidelines which can be divided into aspects of presentation and content. Regardless of the text processing applications used to create it, a business letter's appearance and structure should remain identical throughout the translation process.

Conclusion:

Table 1 and Table 2 in Subclauses 6.2.1 and 6.2.2 show how good the required features can be translated between the two International Standards. Simple text formatting such as bold or italic characters and paragraph formatting such as text alignments can easily be converted between the two formats, with the exception of *theme fonts*, which are not supported in ODF.

5.2.3 Asian language support

Textual description:

Mr Zhang San is going to sign an employment contract with Huaxia, Inc. The human resources (HR) department of Huaxia, Inc. prepares the draft in format A. The draft is then sent to Mr Zhang San's email inbox to ask for comments. Mr Zhang San opens the draft using software supporting format B. After some

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discussion Mr Zhang San finally agrees with the content. He signs the contract and sends it back to Huaxia, Inc. The HR department also signs the contract and prints paper copies.

雇佣合同

华夏公司（以下称甲方）因工作需要，按照有关法律法规，聘用 zhāng sān 张 三（以下称乙方）为我公司员工。经协商，订立如下条款：

壹. 合同有效期限壹年，至 2009 年 12 月 31 日止。
贰. 乙方试用期工资为￥1000 元/月。
叁. …

甲方（盖章）：　　乙方（签名或盖章）：
法定代表人：　　法定代表人：

二〇〇八年十二月三十一日　　二〇〇八年十二月三十一日

Figure 6 — Chinese employment contract

The screenshot above is a short employment contract in Chinese. The translated version is shown in Figure 7:

An employment Contract

Huaxia, Inc. (hereinafter referred to as Party A) , due to work requirements, in accordance with the relevant laws and regulations, employs Zhang San (hereinafter referred to as Party B) as its employee. By consensus, made the following provisions:

1. The contract is valid for one year. The expiration date is December 31, 2009.
2. Wage for a probationary period is RMB 1,000 yuan / month.
3. …

Party A (seal):　　Party B (seal or sign):
Legal representative:　　Legal representative:

December 31, 2008　　December 31, 2008

Figure 7 — Translated contract

In the first line of the body of text above, the first character[4] 华 is dropped into two lines. The employee name is expressed in Chinese characters with Pin-Yin (phonetic transcription). The contract item list is numbered in Chinese sequence characters 壹、贰、叁. The first item in the list shows the date which is a mixture of Arabic numbers and Chinese characters. The second item in the list uses the currency symbol ￥. Another date is used in the bottom line. It consists of Chinese characters only and is different from the previous date.

[4] The first character in the sample text is a SimSun character.

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Implementation:

Use case name: Asian language support **Translation type and properties:**	
One-trip translation	✓
Round trip translation	✓
Presentation instructions	✓
Document content	✓
Dynamic content	
Metadata	
Annotations and security	
Document parts	✓

Required features:
• Text formatting
  ○ OOXML: Subclause 17.3.1*, 17.3.2.10, 17.3.2.20, 17.3.2.26, 17.3.3.25-28, 17.15.1, 17.16.4.3.1, 17.16.5.*, 17.18.59, 18.3.1.92, 18.18.6.*, 18.18.27, 18.18.73, 20.1.10.61, M.1.9.2
  ○ ODF: Subclause 5.4, 6.2.*, 12.2.2, 15.2.21, 15.4.*, 15.5.32-33, 15.6	

Requirements:

This scenario requires the preservation of presentation instructions during multiple translations of a formal business document. Chinese document editing usually has to consider the following properties:

a) *Font family,* which depends on the encoded character set being used. Furthermore, a word processing document should be able to specify up to four fonts which can be used in the contents of a run, for example, ASCII font, High ANSI font, East Asian font and Complex Script font.

b) *Font size,* which may use different measurements from *pt* (point), e.g. hao (号);

c) *Chinese special characters*, such as currency symbol ￥, which can be found in certain fonts only. It requires *number formats*, especially in spreadsheets that support such currency symbols.

d) *Special numbers* such as full-width decimal １, ２, ３; traditional ideograph 甲,乙,丙; zodiac ideograph 子, 丑,寅; Chinese counting 一,二, 三; and Chinese legal simplified, which are used in the numbered list of the above use case: 壹,贰,叁.

e) *Special date and time format* such as “August 9, 2008” can be expressed as 二〇〇二年八月九日 or 2008 年 8 月 9 日; “5:36” am can be expressed as 上午五时三十六分 or 上午 5 时 36 分.

f) *Digital formats* such as 12345 can be expressed as 一万二千三百四十五 or 壹万贰仟叁佰肆拾伍 (popularly used in accounting).

g) *Writing direction* such as lines from right to left and text flow from top to bottom;

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h) *East Asian typography rules* for first and last character per line (kinsoku) such as the characters which are not allowed to appear at the beginning and end of the lines, or the rule defining whether the space between Chinese and Western characters should be adjusted or not.

i) *Sorting method* to be used when sorting data in either word processing tables or spreadsheet tables, defining whether data should be sorted by Pin-Yin or stroke;

j) *Chinese typography settings* such as characters above other characters, phonetic transcription Pin-Yin used in the above use case, and similar;

k) *Automatically adjusting* the spacing of Latin and Chinese text as well as Chinese text and numbers;

l) *Settings for the document grid*, which enables precise layout of full-width Chinese characters within a document by specifying the desired number of characters per line and lines per page for all Chinese text content in the section.

A formal Chinese document should strictly adhere to these typesetting conventions. A formal Chinese document's appearance and structure should remain identical throughout the translation process, regardless of the word processing applications used to create it.

Conclusion:

Both formats offer support for Asian languages, such as Chinese fonts, sorting methods, kinsoku, text direction and document grids mentioned in the requirements. But due to differences in descriptive power, the appearance and structure created by either format may have some discrepancies when translated into another format. For example, as fonts for text runs (span) both formats support Western fonts, the East Asian font and the Complex Script font. However, ODF can specify different sizes and weights for each of them while OOXML can't. When displaying special numbers in numbering, OOXML provides a number construction method (counting mode) as well as a number sequence where each sequence can have different numbering formats, e.g., *chineseCountingThousand* and *chineseCounting*. In ODF only the *number sequence* is supported, and it can use one numbering format only. Both formats provide date and time formats, but they are not identical. Therefore it is not known if every format can be translated without difficulty. For example, 二〇〇八年十二月三十一日星期三 in OOXML cannot be translated into ODF. Differences also occur in typesetting taboos and rules for Asian languages. OOXML provides a superset of the typesetting taboos and rules in ODF, therefore some of this information will be lost in the translation. Regarding the phonetic guide, OOXML specifies the appearance in more detail than ODF does. For example, OOXML allows the distance between phonetic guide text and phonetic guide base text as well as the phonetic guide text font size to be appointed; this is not supported by ODF although the font size of the ruby text can be adjusted by the associated character style.

5.2.4 Line breaks in East Asian text

Textual description:

Chulsoo uses a format A word processing application to write down Korea's national anthem lyrics for his cousin who uses a format B word processing application. Since Chulsoo's cousin is a second generation American Korean who does not speak Korean well, Chulsoo wants to make sure that his cousin learns correct Korean including word spacing and the correct grammar rules through the lyrics.

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동해물과 백두산이 마르고 닳도록 하느님이 보우하사 우리나라 만세 무궁화 삼천리
화려강산 대한 사람 대한으로 길이 보전하세. 남산위에 저 소나무 철갑을 두른 듯 바람
서리 불변함은 우리 기상일세 무궁화 삼천리 화려강산 대한사람 대한으로 길이 보전하세.
가을 하늘 공활한데 높고 구름 없이 밝은 달은 우리 가슴 일편단심일세 무궁화 삼천리
화려강산 대한사람 대한으로 길이 보전하세 이 기상과 이 맘으로 충성을 다하여 괴로우나
즐거우나 나라 사랑하세 무궁화 삼천리 화려강산 대한사람 대한으로 길이 보전하세.

Figure 8 — Korean text with character unit support

동해물과 백두산이 마르고 닳도록 하느님이 보우하사 우리나라 만세 무궁화 삼천리 화려
강산 대한 사람 대한으로 길이 보전하세. 남산위에 저 소나무 철갑을 두른 듯 바람 서리 불
변함은 우리 기상일세 무궁화 삼천리 화려강산 대한사람 대한으로 길이 보전하세. 가을 하
늘 공활한데 높고 구름 없이 밝은 달은 우리 가슴 일편단심일세 무궁화 삼천리 화려강산
대한사람 대한으로 길이 보전하세 이 기상과 이 맘으로 충성을 다하여 괴로우나 즐거우나
나라 사랑하세 무궁화 삼천리 화려강산 대한사람 대한으로 길이 보전하세.

Figure 9 — Korean text without character unit support

Implementation:

To ensure the Korean word spacing grammar rules are correctly observed, character units for East Asian text should be implemented in both word processing formats. At the end of first lines in Figure 8 and Figure 9, the word 대한 is supposed to be one unit after the 화려강산 unit. Format A in Figure 8 changes the line to correctly display the Korean words while format B in Figure 9 breaks down one word into two lines.

Use case name: Line breaks in East Asian languages **Translation type and properties:**	
One-trip translation	✓
Round trip translation	
Presentation instructions	✓
Document content	✓
Dynamic content	
Metadata	
Annotations and security	
Document parts	

Required features:
• Indexes
  ○ OOXML: Subclause 21.1.2.2.2, 17.3.1.16
  ○ ODF: Subclause 15.5.34	

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Requirements:

If a format A user choose not to allow Korean texts to wrap in the middle of a word, then at the end of a line, a Korean word would stick together without breaking into two parts in two different lines regardless of the line break. After the translation to format B is complete, a user of format B should able to see the Korean word as one unit. The main requirement in this scenario is that the Korean words at the end of the lines should stay as one word when the document translates from format A to format B.

Conclusion:

OOXML supports the function that East Asian words should not be broken in case of a line break. DrawingML also introduces an attribute called *@enLnBrk* which specifies whether an East Asian word can be broken in the middle of a word and wrapped onto the next line without a hyphen being added. ODF does not support line break rules for East Asian words. Furthermore, when users use East Asian in their documentation, both International Standards do not support hyphenation use in line breaks. Detailed requirements on Japanese text layout including line breaks are given in the W3C Working Group Note http://www.w3.org/TR/2009/NOTE-jlreq-20090604/.

5.2.5 Text direction

Textual description:

John needs to figure out how his company's East Asia Division EAD has been working on their quest to balance the worldwide real estate business. He asks his EAD partner for a sales report. John uses his format A word processor to open the EAD report provided by his EAD partner who in turn uses a format B word processor.

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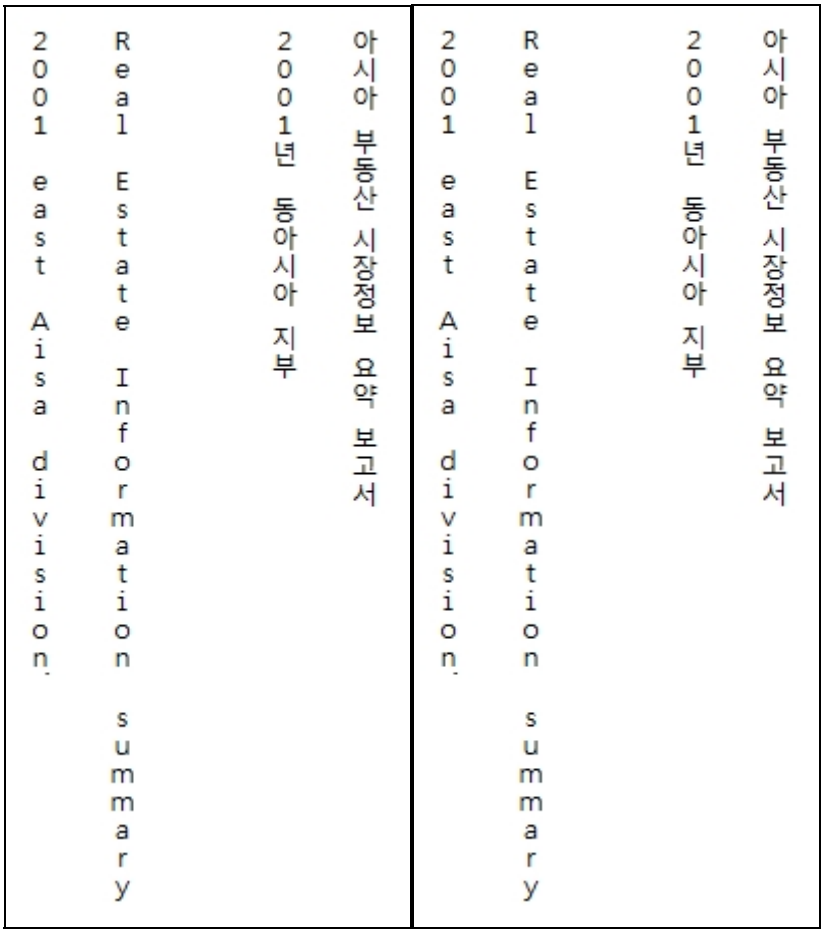

Figure 10 — Top to bottom vertically and right to left text flow in paragraphs in OOXML and ODF

2001 년 아시아 주요국 부동산 시장 보고서		
일 본	임 대	￥150,000
	판 매	￥42,000,000

Figure 11 — Top to bottom vertically and left to right text flow in an OOXML table

2001년 아시아 주요국 부동산 시장 보고서		
일 본	임 대	￥150,000
	판 매	￥42,000,000

Figure 12 — Top to bottom vertically and left to right text flow in an ODF table

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Implementation:

Various text flows can occur in a document. Text can flow from top to bottom vertically, left to right horizontally and vice versa respectively in the entire document or a document part such as a paragraph, a table, and a section.

Use case name: Text direction **Translation type and properties:**	
One-trip translation	✓
Round trip translation	
Presentation instructions	✓
Document content	✓
Dynamic content	
Metadata	
Annotations and security	
Document parts	✓

Required features:
• Text direction
  ○ OOXML: Subclause 17.3.1.41, 17.4.7.3, 17.6.20, 17.18.93
  ○ ODF: Subclause 15.2.19, 15.4.42~43, 15.5.39~37, 15.7.8, 15.8.13, 15.11.1, 15.11.3, 15.27.9~12, 15.27.27	

Requirements:

In Figure 10 the text flow in the paragraph is top to bottom vertically. In Figure 11 and Figure 12 the text flow in the tables is top to bottom vertically for country names and the other texts flow left to right horizontally. The main requirement in this scenario is that the text flow in a paragraph and a table in a format B document can be correctly translated into a corresponding paragraph and table in a format A document.

Conclusion:

Text flow in paragraphs and tables can be well translated between both formats. Both International Standards support top to bottom vertically, right to left horizontally, and vice versa respectively. In OOXML text directions apply in paragraphs, tables, and sections. In ODF text directions apply in paragraphs, tables, and frames. However, note that when dealing with text direction within a table, ODF inherits the text direction of the associated paragraph while OOXML uses separate text directions within the table.

5.2.6 Phonetic guide functions

Textual description:

Yunjung opens a report about the history of the Korean language from her colleague Prof. Kim. Yunjung uses a word processing application which uses format A to open the file. Prof. Kim had created it with a different word processing application which uses format B. Figure 13 shows a sample paragraph of the report created with an OOXML tool.

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訓민正音 해례解例본, 예의例義본, 그리고 언해諺解본이 있다.

해례본에는 1940년 안동에서 발견된 것과 2008년 상주에서

발견된 것 두 부가 존재한다. 御製의 序文은 다음과 같이 시작한다.
어제 서문

Figure 13 — Sample ruby text[5] in Korean in OOXML

훈민정음 해례解例본, 예의例義본, 그리고 언해諺解본이 있다.

해례본에는 1940년 안동에서 발견된 것과 2008년 상주에서

어제 서문
발견된 것 두 부가 존재한다. 御製의 序文은 다음과 같이 시작한다.

Figure 14 — Possible result of a translation to ODF

Implementation:

One of the more advanced features of word processing is the usage of the ruby text especially in Asian languages such as Chinese, Japanese, and Korean. The Korean language is based on Hanja (Chinese characters). These characters are sometimes insufficient to determine meanings if the intended readers of the text are not familiar with Hanja. To avoid this, Korean text uses ruby text to provide additional information. This excerpt shows a sample paragraph using ruby texts in a Korean text document. There are right vertical, right, and bottom ruby texts associated with the base characters in Figure 13.

5 Refer to http://www.w3.org/TR/ruby/ for information about "ruby text"

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Use case name: Phonetic guide functions **Translation type and properties:**	
One-trip translation	✓
Round trip translation	
Presentation instructions	✓
Document content	✓
Dynamic content	
Metadata	
Annotations and security	
Document parts	✓

Required features:
• Text direction
  ○ OOXML: Subclause 17.3.3.25~28; 17.18.75
  ○ ODF: Subclause 5.4; 14.8.4; 15.2.21~28; 15.6.*	

Requirements:

During the translation between the two formats, presentation instructions such as the vertical, above and below ruby text position with its associated base text, as shown in Figure 13, should be preserved. Document parts should be consistently translated, thus enabling readers to edit the ruby text and super/sub scripts within their position.

Conclusion:

ODF and OOXML both support ruby text. OOXML supports the *@rightVertical* attribute, which specifies that phonetic guide text must be right aligned with respect to the base text, and displayed vertically and to the right of the base text, regardless of the alignment of the base text. ODF does not support this right vertical alignment which is used quite often in Asian languages including Korean with Hanja characters.

5.2.7 Tables and field functions

Textual description:

Using format A John plans to provide an invoice summary draft for his marketers to inform them about their monthly trading results. After filling out the sales report John emails it to his marketers. Using different word processing applications supporting format B, the marketers wait for the figures so they can spread the news to their own division staff.

Figure 15 shows a brief excerpt from the sales report.

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Implementation:

One of the more advanced features of text processing is the usage of tables and predefined field functions as seen in Figure 15. This excerpt shows a table with joined cells and common text formatting. Cells are joined up to span multiple rows and columns. Different cell alignments appear as left, centre and right aligned text. A hyperlink is inserted into the header row of the table. The figures are presented as nested tables.

Real Estate Information Bulletin Summary 2010 www.johnmarketer.com/reports		*Wednesday, 01 June 2011*	
Divisions & Properties		**2010 Results**	
		1st Quarter	*2nd Quarter*
Division 1	Rentals	$150 000	$175 000
	Sales	$420 000	$382 000
Division 2	Rentals	$135.000	$175 000
	Sales	$390 000	$376 000
Division 3	Rentals	$310 000	$340 000
	Sales	$612 000	$685 000

Figure 15 — Sample table

Use case name: Tables and field functions **Translation type and properties:**	
One-trip translation	✓
Round trip translation	
Presentation instructions	✓
Document content	✓
Dynamic content	
Metadata	
Annotations and security	
Document parts	✓

Required features:
• Tables
  ○ OOXML: Subclause 17.*
  ○ ODF: Subclause 8.1, 15.*	

Requirements:

When translating such a document between the ODF and OOXML International Standards, the result must meet structure related requirements in addition to preserving the visual appearance of simple text and paragraphs as shown in Figure 5. Document parts must be consistently translated to enable users to edit hyperlinks, table cells and even complex nested tables after converting the document's format.

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Conclusion:

The table *tables* in subclause 6.2.3 shows that the translation of table structures between ODF and OOXML is supported in most cases. Problems appear when using table background patterns (not supported by ODF) as well as sub tables (not supported by OOXML). Another problem is ODF's lack of support for certain layouts, such as the *right to left* layout. Such layout options could be emulated within the options available to ODF, but even so they would still require a complex translation. ODF's lack of support for document themes that are frequently used in OOXML could cause information loss during translation. These differences restrict the translatability of tables between the two International Standards.

5.2.8 Footnotes and endnotes

Textual description:

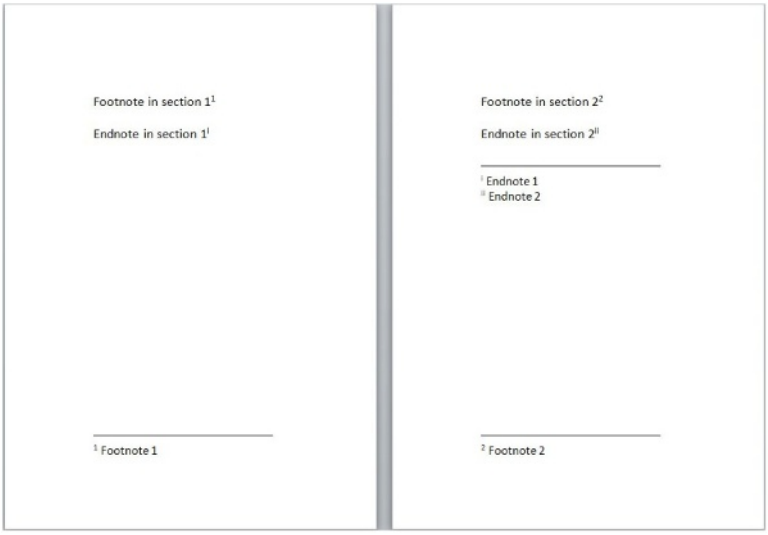

Figure 16 — Footnotes and endnotes in OOXML

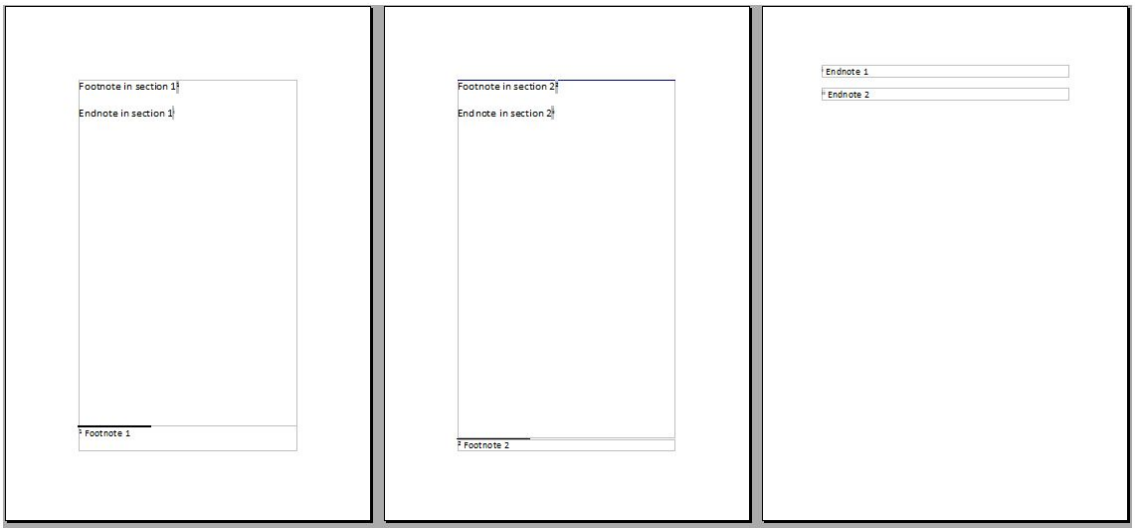

Figure 17 — Footnotes and endnotes in ODF

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John is working on scholarly papers for his standardization forum. He sends two draft papers with footnotes and endnotes to his colleague Smith to check conformance of contents and references. John uses a format A word processor. He saves the two drafts as *paper1_draft* and *paper2_draft*. Smith makes a few corrections on John's papers with his format B word processor and saves them as *paper1_final* and *paper2_final*. Afterwards Smith sends the final versions to the other members of the forum. Some open the files with a format A word processor, others open them with a format B word processor.

Implementation:

Authors use footnotes and endnotes to present references in a document. A *footnote reference mark* in the body of the text is used to indicate that additional information is in a footnote and an *endnote reference mark* indicates that additional information is in a endnote. Both footnotes and endnotes use a numbering system to show readers if they need to look for footnotes at the bottom of the pages or endnotes at the end of the section or at the end of the document.

Use case name: Footnote and endnote **Translation type and properties:**	
One-trip translation	✓
Round trip translation	
Presentation instructions	✓
Document content	✓
Dynamic content	
Metadata	
Annotations and security	
Document parts	✓

Required features:
• Footnote & Endnote
  ○ OOXML: Subclause 11.3.4, 17.11.*
  ○ ODF: Subclause 5.3.1, 6.3.1, 6.6.5, 14.9.2, 15.2.18, 15.2.20, 15.7.9	

Requirements:

In both sections footnotes should be located at the bottom of the page under the separation lines. Endnotes should be located at the end of the document. The main requirement in Figure 16 and Figure 17 is that endnotes have to be placed at the end of the document.

Conclusion:

The numbering system used for footnotes and endnotes (Arabic and Roman numerals) translates well between OOXML and ODF. The location of the footnotes is similar in both formats. The thickness and length of the separation lines are a little bit different but also quite similar.

The major difference is the location of endnotes. The author intends to place the endnote at the end of the document. OOXML places the endnotes at the end of the document within the same page. ODF places all endnotes in a new page after the last page of the text. OOXML and ODF also support the location of endnotes at the end of each section.

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5.2.9 Itemization and numeration

Textual description:

Besides common table functionality, other important features commonly used in office documents are numerations and lists, which are often used in non-fictional texts like technical documentations as a common means of presenting structured information. John gets a documentation paper from his technical department about how to log on to his new workstation. The document was created using format B. It describes the related tasks in a few steps. John opens the document using format A to reveal the following:

1. Turn on screen
2. Move mouse in case screensaver is active
3. Enter authentication information
    a. Username: jmarketer
    b. Password: jmarketer123!
4. To lock screen press: [Windows Key] + L

Figure 18 — Numbered items

Implementation:

The example shown in Figure 18 contains a simple list of instructions typed in plain text. The instructions are listed using simple numerals and can contain special characters.

Use case name: Itemization and numeration **Translation type and properties:**	
One-trip translation	✓
Round trip translation	
Presentation instructions	✓
Document content	✓
Dynamic content	✓
Metadata	
Annotations and security	
Document parts	

Required features:
• Itemization and Numeration
  ○ OOXML: Subclause 8.3, 17.9
  ○ ODF: Subclause 4.2, 14.9	

Requirements:

During a translation between both International Standards it should be possible to retain the numeration and the structural order of list items.

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Conclusion:

Due to the ambiguous wording of the ODF International Standard for numeration, multiple interpretations of certain itemization and numeration properties are possible. Both formats have multiple ways of applying numbering to text segments. Maintaining visual fidelity would probably call for relatively complicated transformation methods between the two International Standards, even if the logical hierarchy of different layers of indices was preserved.

The translation of itemization and numeration properties between the International Standards ODF and OOXML is described in more detail in subclause 6.2.5.

5.2.10 Indices and tables of contents

Textual description:

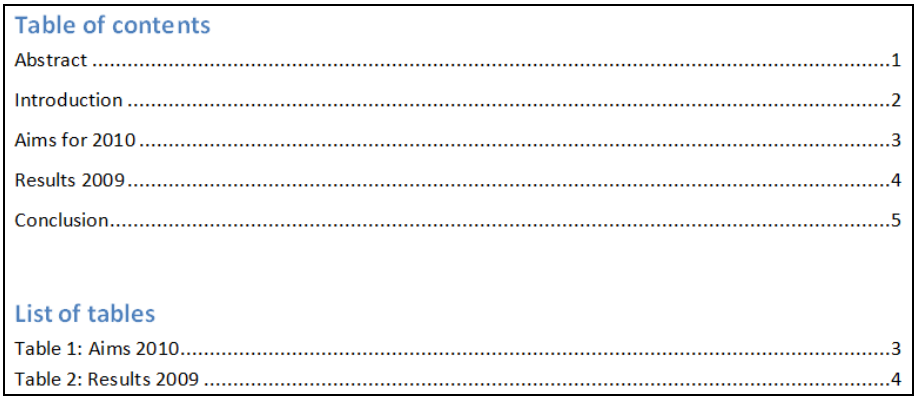
Table of contents
Abstract 1
Introduction 2
Aims for 2010 3
Results 2009 4
Conclusion 5

List of tables
Table 1: Aims 2010 3
Table 2: Results 2009 4

Figure 19 — Auto-generated indices

After opening a document with his format A application, John Marketer likes to cut out different chapters to generate a condensed version of the document to email it to his colleagues. The screenshot in Figure 19 shows an example index consisting of a *Table of contents* and a *List of tables* of a market report John downloaded from the internet. It was originally created using format B.

Implementation:

In addition to continuous text and structural and presentation features, large documents can contain indices and tables of contents, to enhance readability and to make them more human searchable. Indices like the one shown in Figure 19 should display the document's structure based on headings and page numbers as well as figures and tables based on their captions. Indices should be generated automatically by the available word processing application and kept updated as necessary.

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Use case name: Indices **Translation type and properties:**	
One-trip translation	✓
Round trip translation	
Presentation instructions	✓
Document content	
Dynamic content	✓
Metadata	
Annotations and security	
Document parts	✓

Required features:
• Indices
  ○ OOXML: Subclause 17.16
  ○ ODF: Subclause 7.*	

Requirements:

The indices should be adapted automatically; deleted chapters or tables should no longer appear in the index and the page numbers of the remaining parts of the document should be updated. The main requirement in this scenario is that the table of contents and an index from a format A document can be correctly translated into a corresponding table of contents and index in a format B document.

Conclusion:

Although the two document formats differ in their approaches to the generation of tables of contents and indices, they do indeed offer comparable levels of support for this feature. Implementations must take into account the different models, which makes the translation much more complex, especially when documents combine the available models. A more detailed view of index handling is given in subclause 6.2.7. While a table of contents may retain its property to be generable after translation from OOXML to ODF this property may be lost for a list of tables/figures. Additionally a user defined appearance of the table of contents will be lost during a translation process from OOXML to ODF although ODF allows user adjusted appearance of indices.

5.2.11 Metadata and settings

Textual description:

John authors a text document using format A, which is to be edited by his secretary Mary who uses an application supporting format B. The original letter is written using an English vocabulary, punctuation and spell check. When Mary receives the document, her application should immediately recognize which language was used when creating the document.

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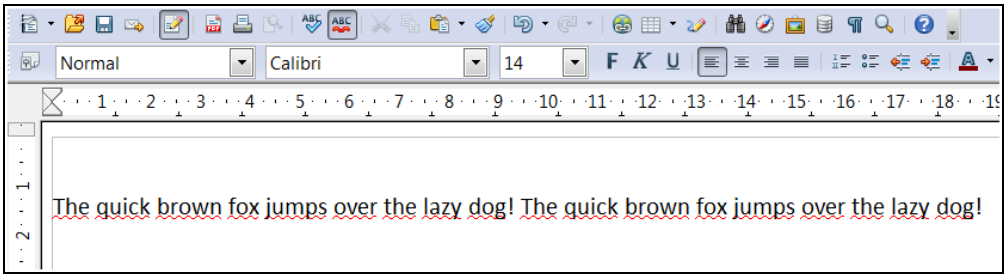

Figure 20 — English text with German settings

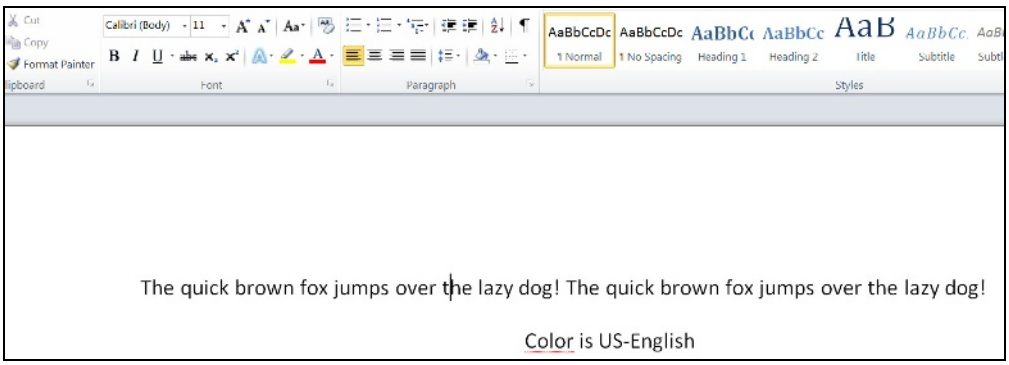

Figure 21 — English text with English (en-GB) settings

```
<office:document-styles xmlns:office="urn:oasis:names:tc:opendocument:xmlns:office:1.0"
    xmlns:style="urn:oasis:names:tc:opendocument:xmlns:style:1.0">

    <office:styles>

        <style:default-style style:family="paragraph">

            <style:text-properties style:use-window-font-color="true" style:font-name="Calibri"
                fo:font-size="11pt" fo:language="en" fo:country="GB"
               />
        </style:default-style>

<w:styles xmlns:w="http://schemas.openxmlformats.org/wordprocessingml/2006/main">
    <w:docDefaults>
        <w:rPrDefault>
            <w:rPr>
                <w:lang w:val="en-GB" w:eastAsia="en-US" w:bidi="ar-SA"/>
            </w:rPr>
        </w:rPrDefault>
```

Figure 22 — Language metadata info in ODF and OOXML

Implementation:

To ensure a correct interpretation and description of word processing documents, certain additional information must be stored as metadata. One example of such metadata is the paragraph style indicating the language used in authoring a document. Grammar and spelling checkers will need this information when working with the translated document.

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The document shown in Figure 20 was written in English with an application normally using German as its default language. Thus, the written words are not recognized by the German spelling checker, as shown by the squiggly red lines displayed under each word. In Figure 21, the language settings have been modified, as evidenced by the absence of the red lines denoting misspelling. Excerpts from the documents' metadata files are given in Figure 22, where the position indicating the default language is underlined in red.

Use case name: Metadata and settings **Translation type and properties:**	
One-trip translation	✓
Round trip translation	
Presentation instructions	✓
Document content	
Dynamic content	
Metadata	✓
Annotations and security	
Document parts	

Required features:
• Metadata
  ○ OOXML: Subclause 17.3
  ○ ODF: Subclause 2.*, 3.1	

Requirements:

A target word processing application must be able to correctly interpret a document's metadata if errors are to be avoided. Translation tools should ensure adequate mapping or meaningful default mapping of the metatags when translating between standards.

Conclusion:

Both International Standards support different types of metadata. In OOXML metadata are stored in the app.xml and core.xml files. ODF stores metadata in meta.xml. Language information is stored in the style.xml files. It can be adequately translated. Information about document settings contains presentation instructions. They are stored in setting.xml files. Several metadata such as *creating application* and *creation date* have to be modified during a translation process.

5.2.12 Change tracking and collaboration support

Textual description:

The following scenario illustrates how collaboration between different authors using different text processors should proceed.

The format A user John Marketer and some of his partners are planning to launch an article in the online magazine *OpenBusinessMag*. John Marketer and some other persons will all contribute to it, authoring in different formats. The first draft of the document will be provided by John himself. Figure 23 illustrates the initial version of the article.

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Introduction to Web Services

Web services are one of the major hypes in today's Internet world. But what is so special about Web services? To answer this question let's look at two definitions. The first one gives a statement about the problems, Web services promised to solve two years ago [3].

> "A Web service is a collection of functions that are packaged as a single entity and published to the network for use by other programs. Web services are building blocks for creating open distributed systems, and allow companies and individuals to quickly and cheaply make their digital assets available worldwide."

Companies, that want to make their "digital assets" available to other companies, customers, or to roaming employees, need a new paradigm for the creation of open distributed systems. They need new kinds of "open interfaces" or standards for specific business domains and they need a better infrastructure for the development, operation, and usage of distributed systems. In short, Web services promised to simplify the syntactical and semantically interworking of programs in a distributed and heterogeneous environment that is operated by different, autonomous companies. Let's now look at the current definition from the W3C [6]:

Figure 23 — Continuous text

John sends this document to his co-author with request for comments. Using the format B commenting and change tracking feature the co-authors reviews the document. Comments are marked with the initials of the user entering the comment, with different colours marking comments made by different users. The change tracking function highlights added, edited, moved or deleted text parts. It shows the obsolete text parts in coloured comment boxes as shown in Figure 24 and Figure 25.

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Comment [kpe4]: Who is the author of this citation?

Comment [kpe5]: Please don't use relative dates!

Comment [kpe6]: Like above – please provide exact date!

Figure 24 — Continuous text with annotations

Web services are supporting the following ~~communication protocols~~bindings:

Name	Version
SOAP	1.1
	1.2
REST	1.0

Figure 25 — Continuous text and table with tracked changes

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After the co-author has sent back the revised version of the article, John can revise the text by accepting or rejecting the comments and proposed changes.

Implementation:

One of the most important features for editing large documents with multiple authors is called *collaborative functions* which include user-specific comments and tracking of changes. These functions enable collaborative workflows, allowing document editing and reviewing by multiple participants. The information required for such workflows, including user data, notes or tracked changes, is embedded within the document itself. Proper adoption of such meta-information plays an important role in the collaborative authoring processes.

This type of application, with its workflow support, substantially alleviates the difficulties of revising documents with multiple authors. The foundation for this document lifecycle is the proper conversion of meta-information from one standard to the other, to correctly retain comments and proposed revision information.

Use case name: Change tracking and collaboration functions **Translation type and properties:**	
One-trip translation	✓
Round trip translation	✓
Presentation instructions	
Document content	✓
Dynamic content	
Metadata	✓
Annotations and security	✓
Document parts	

Required features:
• Change tracking and document revision
  ○ OOXML: Subclause 17.*
  ○ ODF: Subclause 3.1, 4.6, 8.3, 12.3	

Requirements:

The references to the paragraphs, words and characters made by John's co-authors using OOXML should be accurately translated in Johns ODF supporting application. The information used for change tracking should also reflect the exact editing (such as highlighted changes) in such a way that it can be accurately reproduced, since it is vital that all proposed changes be rendered properly.

Conclusion:

Both document formats offer support for revision handling, although there are significant differences in the scope of their revision-handling functionality and their approach to the underlying technical details. For example, ODF does not allow for tracking changes made within tables, while OOXML tracks changes to the content of tables as well as changes to the structure of tables themselves. While ODF only records the fact that a text attribute, such as the used text font, has changed, OOXML records the full history of changes made, ensuring the ability to reconstruct the previous text version. Another difference is in the understanding of text comments. While OOXML allows adding comments to arbitrary text ranges, this feature is not supported by ODF. However similar functionality may be provided by inserting notes associated with a point within the text

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rather than a range. The table *change tracking and document revision* in subclause 6.2.8 details how collaborative functions could be used when translating between the different document formats.

ODF (ISO/IEC 26300) does not provide enough information for a meaningful analysis of the support for revision-handling and change tracking. For this reason OASIS has introduced the *Advanced Document Collaboration Subcommittee* late 2010 that will define corresponding features in upcoming versions of ODF.

5.2.13 Bibliographies and optional document parts

Textual description:

The following scenario illustrates the management of bibliographies and optional document parts.

Format A user John Marketer and his partners working on an article decide to add citations and a bibliography to the article. John Marketer copies citations from his private bibliography database to the document's internal bibliography sources and sends it to his co-authors who are using format B. The co-authors add their references to the document's bibliography sources and update the bibliography. One author adds an optional section to the paper that should only be used in the paper's long version.

INTRODUCTION TO WEB SERVICES

Web services are one of the major hypes in today's Internet world. But what is so special about Web services? To answer this question let's look at two definitions. The first one gives a statement about the problems, Web services promised to solve two years ago (1).

> "A Web service is a collection of functions that are packaged as a single entity and published to the network for use by other programs. Web services are building blocks for creating open distributed systems, and allow companies and individuals to quickly and cheaply make their digital assets available worldwide."

Companies, that want to make their "digital assets" available to other companies, customers, or to roaming employees, need a new paradigm for the creation of open distributed systems. They need new kinds of "open interfaces" or standards for specific business domains and they need a better infrastructure for the development, operation, and usage of distributed systems. In short, Web services promised to simplify the syntactical and semantically interworking of programs in a distributed and heterogeneous environment that is operated by different, autonomous companies. Let's now look at the current definition from the W3C (2):

BIBLIOGRAPHY

1. **W3C.** Web Services Description Language (WSDL) 1.1. [Online] 01 March 2001. [Cited: 20 February 2010.] http://www.w3.org/TR/wsdl.

2. —. Web Services Description Language (WSDL) Version 2.0 Part 1: Core Language. [Online] 26 June 2007. [Cited: 31 August 2009.] http://www.w3.org/TR/wsdl20/.

Figure 26 — Citations and bibliographies

Implementation:

In most scientific papers the authors have to provide a bibliography with references to cited articles, books, or Web sites. In case an author writes several papers it is desirable to have a bibliography database storing the information about all important papers and to be able to copy the information about the cited papers to the document. Additionally it is advantageous to store the same information attributes common to all cited papers.

Word processing applications should be able to generate a bibliography from the cited papers and update this bibliography if some new citations have been added.

With optional text document parts it is important that different applications treat these parts in the same way and that text remains optional after a mapping between the International Standards.

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Use case name: Bibliographies **Translation type and properties:**	
One-trip translation	✓
Round trip translation	✓
Presentation instructions	✓
Document content	✓
Dynamic content	
Metadata	
Annotations and security	
Document parts	✓

Required features:
• Bibliography
  ○ OOXML: Subclause 11.3.8
  ○ ODF: Subclause 7.9, 7.1.4
• Glossary document/hidden sections
  ○ OOXML: Subclause 17.12
  ○ ODF: Subclause 4.4.1	

Requirements:

A minimum requirement is that citations remain citations and bibliographies remain bibliographies. Thus it should be possible to add a new and to change or remove an existing citation and regenerate the bibliography. It is desirable that the type of information stored in the document preserves its semantics, thus an author should remain an author and a title should remain a title. The document internal “databases” should be mapped as well as possible.

It is not necessary to translate external bibliography databases between both formats because these databases depend on the word processing application and not on the document standard.

Conclusion:

Both the ODF and OOXML formats support bibliographies and optional document parts. Unfortunately both International Standards use different concepts which make it impossible to define generic translations. However some word processing applications may be able to provide such mappings in a restricted context.

5.2.14 Sub documents and books

Textual description:

Format A user John Marketer decides to split the article on Web services into separate sections to be assigned to the responsible authors. John wants to compose the article from the sub documents created by his co-authors. To guarantee a common "layout" of the final document he distributes document templates to all of them. Each co-worker provides a single chapter that is written in its own document in file format A. All sub documents are stored independently in the file system.

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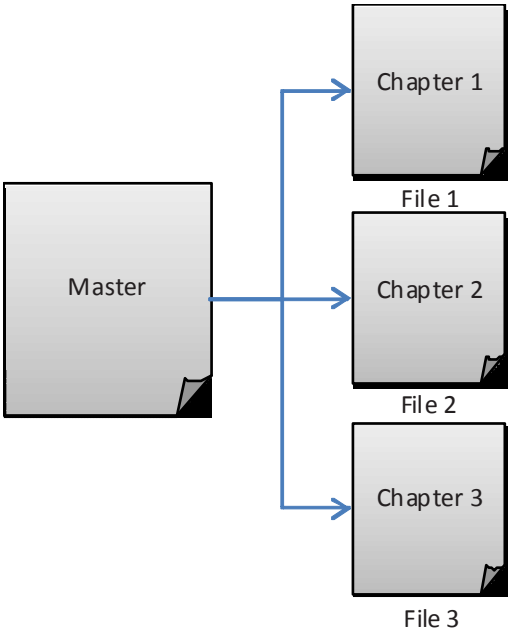

Figure 27 — Master document referencing its sub documents

The full document is combined using a master document, which allows the sub documents to be merged into a single document. The styles are automatically adjusted to the master document's layout properties and settings.

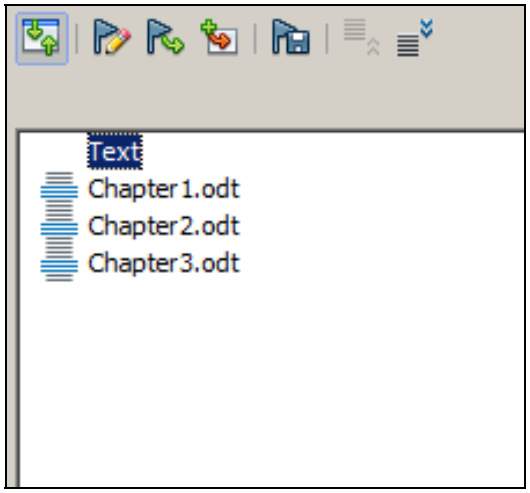

Figure 28 — Linked text sections in an ODF application

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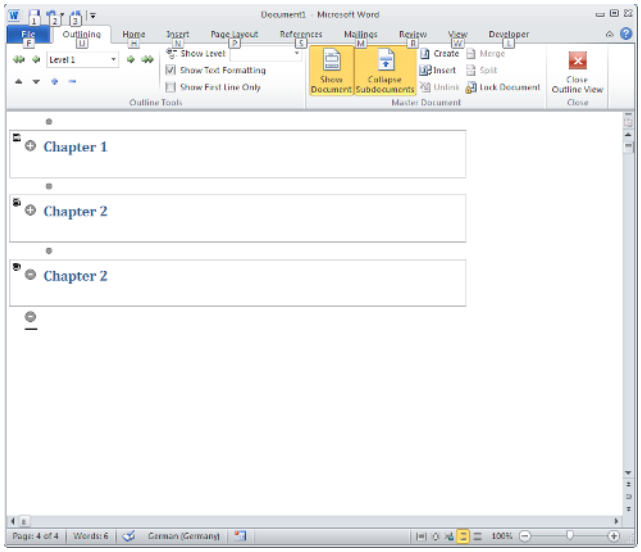

Figure 29 — Sub documents in an OOXML application

Subsequently the complete document will be send to an external proofreader who uses file format B. The revised text will then be returned to John Marketers company via email.

Implementation:

Both ODF and OOXML allow large documents to be broken into a number of smaller ones that can be distributed and edited independently. Both International Standards introduce different terms for the central document referencing sub documents. OOXML uses the name *master document* whereas ODF defines the term *global document* in its specification. The linked entities are called *sub documents* in OOXML and *linked text sections* in ODF.

Since all chapters in the example above are stored in separate documents, they can be modified independently by all co-workers. A master document has to be created and references to the appropriate sub documents. The style properties of the main documents can automatically be applied to all chapters that were included.

Use case name: Sub documents and books **Translation type and properties:**	
One-trip translation	✓
Round trip translation	
Presentation instructions	✓
Document content	✓
Dynamic content	✓
Metadata	
Annotations and security	
Document parts	✓
Required features: • Linked text s ODF: Subclause 2.3.1, 4.4 • Sub documents and books OOXML: Subclause 11.6	

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Requirements:

The full document created by John and his co-workers has to be organized in equivalent document parts (master and sub documents) when it is opened on ODF or OOXML platforms. After switching from one format to another, sub documents still have to be readable and writeable as standalone documents. The representation of the compound document has to be unified automatically. The tables of contents, bibliographies and other indexes have to be updated without manually editing the master document.

Conclusion:

Both International Standards provide similar features allowing the creation of master or global documents that combine independent document entities using references. In both cases the formatting can automatically be unified by the presentation instructions of the master. For this reason the translatability between both International Standards initially seems to be quite high. The translatability in a particular case is tightly coupled to the translatability of the features that were used. Since generic mapping for the commonly used citations and bibliographies seems to be impossible, many translations of compound documents will fail as well.

5.2.15 Forms

Textual description:

John Marketer's company has been optimizing its internal workflow processes for years. Paper based workflows have become so rare that almost all corporate forms are digitalized. At John's company, these different formats are gathered on an internal website accessed by most people at the company. The aforementioned workflows sometimes involve the transfer of forms between computers running different word processing applications. This use case illustrates some simple features commonly used in forms:

Figure 30 — OOXML form

Implementation:

Modern word processing documents are tightly integrated into electronic workflows. They serve as static output formats for reports or certificates and, with their extended form functionalities, they can also be integrated as dynamic, data driven front-ends.

The form in Figure 30 shows different textboxes. The form is filled out by an applicant and submitted to a workflow system which integrates the form's data directly into applications which further process the data.

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Use case name: Forms **Translation type and properties:**	
One-trip translation	✓
Round trip translation	
Presentation instructions	✓
Document content	✓
Dynamic content	✓
Metadata	
Annotations and security	
Document parts	✓

Required features:
• Forms
  ○ OOXML: Subclause 17.16
  ○ ODF: Clause 11	

Requirements:

To pass this form between applications based on ODF and applications based on OOXML, behaviour and content type of the form fields needs to be preserved. Translating the form from one format to the other for processing or viewing should not result in data corruption.

Conclusion:

Both International Standards define forms based on text boxes, check boxes, and drop-down lists. Nevertheless translation of forms between ODF and OOXML is likely to prove problematic, since the two technologies diverge strongly in many aspects of form handling. While ODF is directed to the open standard XForms (Version 1.0 from 2004), OOXML uses simply *form fields* that support insertion of data through *form controls*. Although both concepts work with user-defined XML structures, which help to export structured data from text processing documents, the translatability potential of forms between the two International Standards is merely low to average.

5.2.16 Vector graphics

Textual description:

In the following scenario, a logo stored in the common WMF (Windows Metafile) format is embedded into a format A document by Mary and emailed to John who is using format B. John evaluates and approves the logo. Ideally, the logo should be displayed by the format B application in a similar way as it has been displayed by the format A application.

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Figure 31 — Embedded vector graphic

Implementation:

Vector graphics are essential elements of modern document content and presentation, especially for printing purposes. They are flexible in use, editable to a certain extent, and scalable to nearly any size without any need for special expertise in graphics.

Use case name: Vector graphics **Translation type and properties:**	
One-trip translation	✓
Round trip translation	
Presentation instructions	✓
Document content	✓
Dynamic content	
Metadata	
Annotations and security	
Document parts	✓

Required features:
• Vector graphics
  ○ OOXML: Subclause 8.6
  ○ ODF: Subclause 9.3	

Requirements:

Vector graphics embedded in documents should maintain their appearance, scaling, and quality when translating documents between the two formats. There should be no discernible difference between graphics presentation under ODF and OOXML. This applies equally to graphics properties such as pixel size, colour encoding etc.

Conclusion:

Unlike bitmap graphics which are represented simply through a MIME type and are virtually platform-independent, vector graphics pose bigger translation challenges. OOXML essentially defines its own DrawingML format to which the now obsolete VML (Vector Markup Language) was a precursor. ODF recommends the use of SVG (Scalable Vector Graphics) which is not as rich in features and functionality as DrawingML. The ODF International Standard merges the SVG namespace with ODF's namespaces, so the SVG objects in ODF documents can't be handled by generic SVG tools and technologies. These types of

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disparities could pose potential interoperability problems between the two International Standards in the area of vector graphics.

5.2.17 Font embedding and paper size

Textual description:

Mary is a graphic designer. Her computer is equipped with a large font library. One day she sends a design draft to John using format A. However John's computer can only process documents in format B and has limited fonts installed. Mary thus embeds all the fonts used in the document, and sets the paper size for printing to 14cm width and 15cm height. John opens the document and noticed that the paper size is almost correct, however, some text cannot be displayed using the expected fonts although he could still read the text.

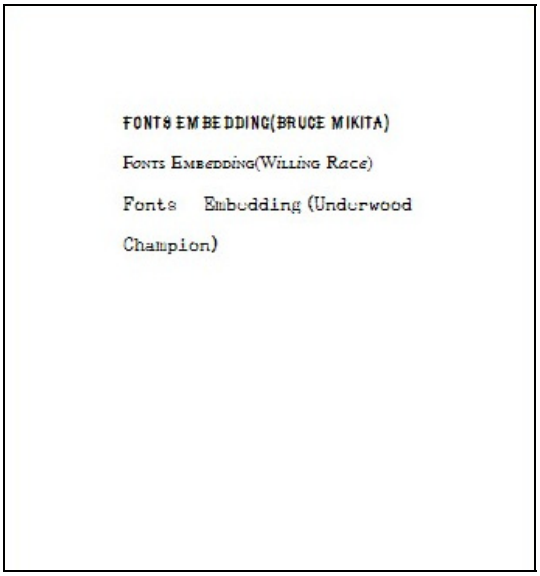

Figure 32 — OOXML document with embedded fonts and 14 x 15cm paper size

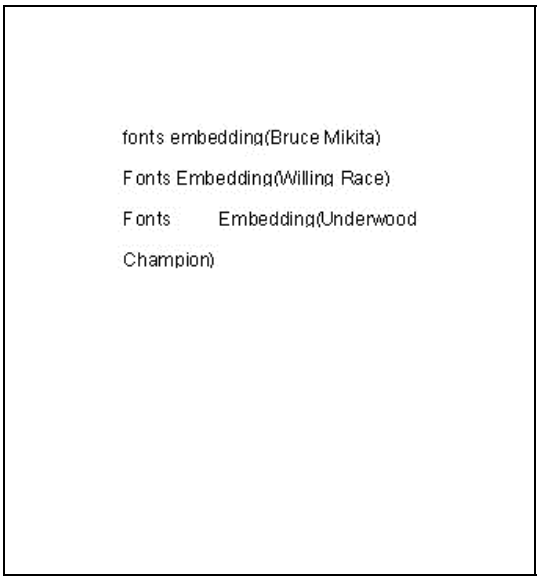

Figure 33 — ODF document using similar fonts and 14 x 15cm paper size

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